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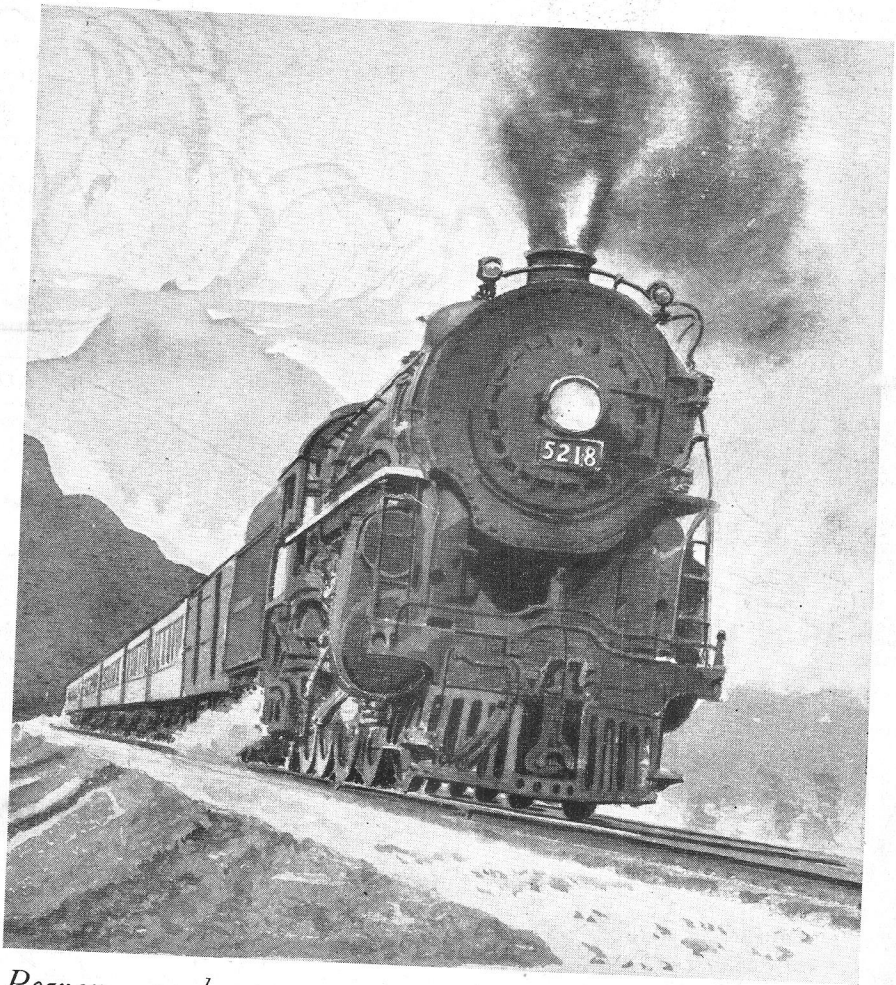
THE MODEL ENGINEER

LBSC

Vol. 95 No. 2372 THURSDAY OCTOBER 24 1946 6d



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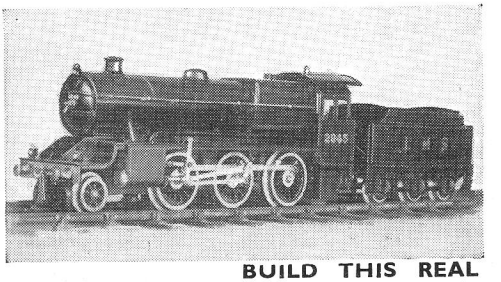

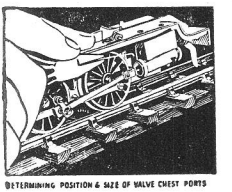

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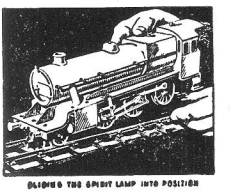

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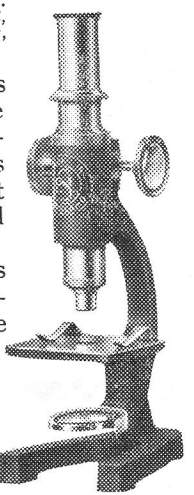

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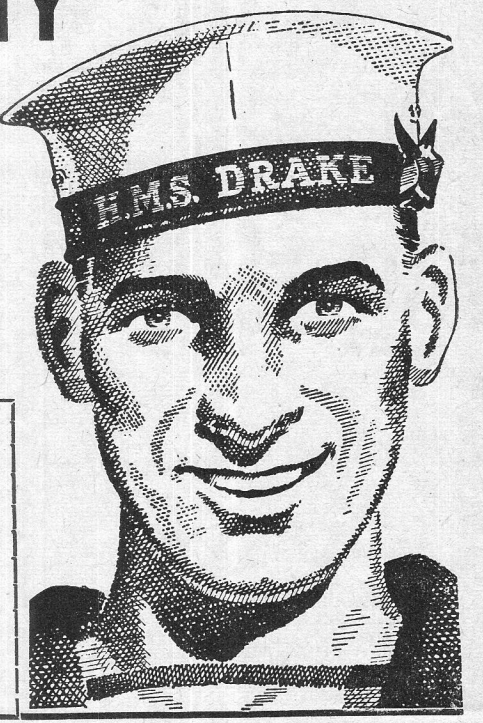

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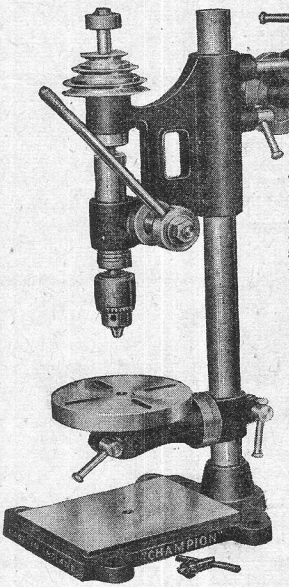

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MODEL ENGINEER

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VOL. 95. No. 2372 OCTOBER 24th, 1946

Smoke Rings

The Sale of Surplus Models

A SUGGESTION has recently been made to me that a depot should be founded somewhere in the West End of London where surplus and second-hand models of all kinds should be displayed for sale on a commission basis. The argument advanced is that many model engineers having finished the building of a model tend to lose interest in it and would not be unwilling to dispose of it at a reasonable figure before starting on a successor. Thus collectors and other interested purchasers would, it is suggested, find in such premises an array of interesting exhibits, many of which would be of an individual character, not competing in any way with the normal trade products. I can see several difficulties in the way of such a scheme. In the first place I do not think it is true to say that model makers lose interest in their models when completed. The finished model usually has many associations of interest and memories of the pleasant hours spent in its construction. It is treasured not only by the actual builder but by his family, who may have shared in the joy of its achievement. It is true that models of this kind occasionally come into the market for various reasons and are advertised in the columns of THE MODEL ENGINEER, but I doubt if there would be a large enough flow of saleable models to keep a show room well supplied. On the other side of the picture, would there be a sufficient number of buyers to justify the maintenance of a show room and staff? There are a few collectors who from time to time may be attracted by a well-made model of historic or special technical interest at a fair price, but collectors are frequently very keen bargain hunters and the prices they pay rarely represent an adequate return for the time and skill represented by the model, if it is a really good one. Second-hand locomotives and power-boats are more likely to find purchasers, if in good working order, for they offer continued pleasure in their running, but the appeal of a glass-case model to buyers is of a different and, I think, a less general kind. To justify itself, a show room for surplus and second-hand models would require to be a section of a larger undertaking devoted to model engineering supplies in general. I do not think it could be self-supporting, but I put the idea forward as a matter to which some of my readers may like to give a little consideration.

Luton's Four Societies

THE get-together spirit of the residents in the Luton area is well exemplified by the fact that there are no less than four model engineering societies centred in that district. These are the famous "Aylesbury Gang," and the societies at the works of The Vauxhall Company, Messrs. George Kent and the Percival Aircraft Company respectively. Although these clubs each have their individual interest and membership, they can when occasion requires collaborate in very practical fashion. Luton should be proud of its model craftsmen. I hear that Mr. Hunting, the Managing Director of the Percival Co., and Mr. MacKenzie, the General Manager, have consented to be President and Vice-President respectively of the club associated with their works.

Exhibition Journeys and Crowds

IN response to my query "Can you beat it?" Dr. J. R. Edisbury sends me an account of a journey by car from Hooton, in Cheshire, when, with three friends, he left home at 4.15 a.m. He spent several hours at the show, stayed the night in town, and returned home on Sunday having covered 420 miles by road "for one exhibition" as he puts it. He adds a suggestion that we should initiate one-way traffic in the main aisles in future exhibitions. "It would allow the less agile like myself to see and appreciate a lot more." That's an idea for us to think about. It looks as though we shall have to install traffic lights as well

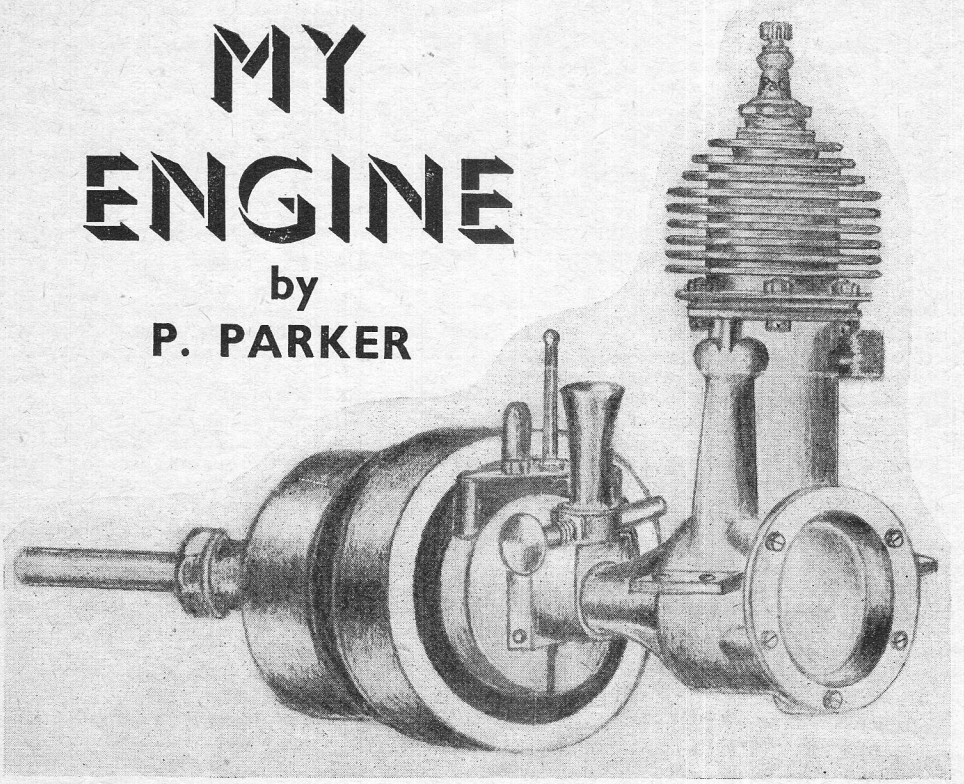
A St. Albans Exhibition

THE St. Albans Model Depot, 1, Hatfield Road, St. Albans, Herts., are organising a Model Engineering Exhibition at the St. Albans Town Hall on December 2nd-9th inclusive.

Percival Marshall

MY ENGINE

by P. PARKER



A pencil drawing of Mr. P. Parker's complete engine unit, with centrifugal clutch and drum

HAVING had considerable experience, as a professional engineer, on all types of I.C. engines, I thought that, for those readers of THE MODEL ENGINEER, who are interested in building their own engines, my experiences would be of help to them.

The engine described below is the second designed and made by me: the first being used as a hack model for experimental purposes, thus enabling me to build the present model on the experience gained, on an almost no-trouble basis. Many interested persons have asked me the following question, "How do you make a start?" So in the words of a famous music hall joke, "Let's get cracking." I obtained all the published books, photographs and catalogues of the popular makes of English, American and German model aircraft engines.

During the search for data I met Mr. Edgar Westbury at a London Model Race Car Club, and am greatly indebted to him for the condensed information he gave. He quoted: "Forget most of the things you know about large petrol engines, and start all over again." A sound idea, and one I found true during the six months on experimental work I spent on my first engine.

However, to get back to my books and photographs, etc., I rejected *en bloc* all the German designs. They were ugly, cumbersome, and far too heavy, more like a mangle than a lightweight aircraft engine. I then turned to the popular English and American designs, making notes under various headings of bore, type, stroke and weights, and here is my final decision, also the specification of my own engine :—

Rotary valve, main-bearing and hollow-crankshaft type. $\frac{7}{8}$ in. bore by $\frac{15}{16}$ in. stroke, giving a cubic capacity of 9.2 c.c. Crankcase and back bearing with cylinder bottom half to exhaust and inlet ports in one casting or unit. Cast-iron cylinder liners; cast-iron ringless piston. Weight not to be more than 1 oz. per c.c.

The reasons for my choice are explained under each heading as this article proceeds, bearing in mind the final choice has been made after very extensive experimental work on engine No. 1.

Crankcase and Cylinder Bottom Half

This I cast by making a steel gravity die. Don't be frightened about this; it is far easier than most people imagine. For myself I have never been inside a foundry, neither have I studied die-casting to any extent, so a word on how I overcame the problem will not be amiss.

I am quite aware most model engineers would make the rather complicated crankcase unit by the usual method of chopping, filing from the solid block, and keeping the local households up all night. Believe me, the time spent on making a steel die is mostly all lathe work, and will amply counterbalance the time spent on the previous method.

I obtained three pieces of $2\frac{3}{4}$-in. mild steel; the large diameter being necessary to take the

slots needed for lugs on side of crankcase. No. 1 piece was bored to outside diameter of crankcase, the taper was 2 deg. to allow casting to draw without hanging. No. 2 piece was spigoted to first and bored out to size of main-bearing casting, the support webs being filed in afterwards. Small air holes were drilled at base of webs to exclude air when casting. No. 3 piece was bored same diameter as No. 2 piece, this to serve as extension to hold in lathe chuck when boring crankcase. The end of this bore was threaded to take a casting-extractor bolt. Piece No. 1 was then placed on 90-deg. angle-plate and bored out to outer diameter of cylinder casting, afterwards milled flat to required height, i.e. base of cylinder casting at point where the cylinder base and crankcase unite.

A piece of 2-in. diameter mild steel was then drilled out, split down middle, two halves soldered together and bored out to outer casting size of cylinder; the exhaust port being then drilled and filed to shape.

When preparing die for casting, clamp the three pieces together in their respective positions, and place cylinder die over hole in piece No 1, i.e., crankcase main die. When filing inside diameter for burrs, lugs, etc., always file in the direction of casting draw, and remove file scratches as much as possible, and remember, the lowest point must always be in the direction of the casting draw. The die should be well heated before pouring.

I used Silicon aluminium for this, a much more ready flow and smoother casting being obtained.

The combined method of constructing the crankcase main bearing and bottom half of cylinder in one-piece casting is certainly far the best method of manufacture, whether as a mass-production or single basis. It does away with joints, small nuts and bolts which, everyone knows, are an endless source of trouble.

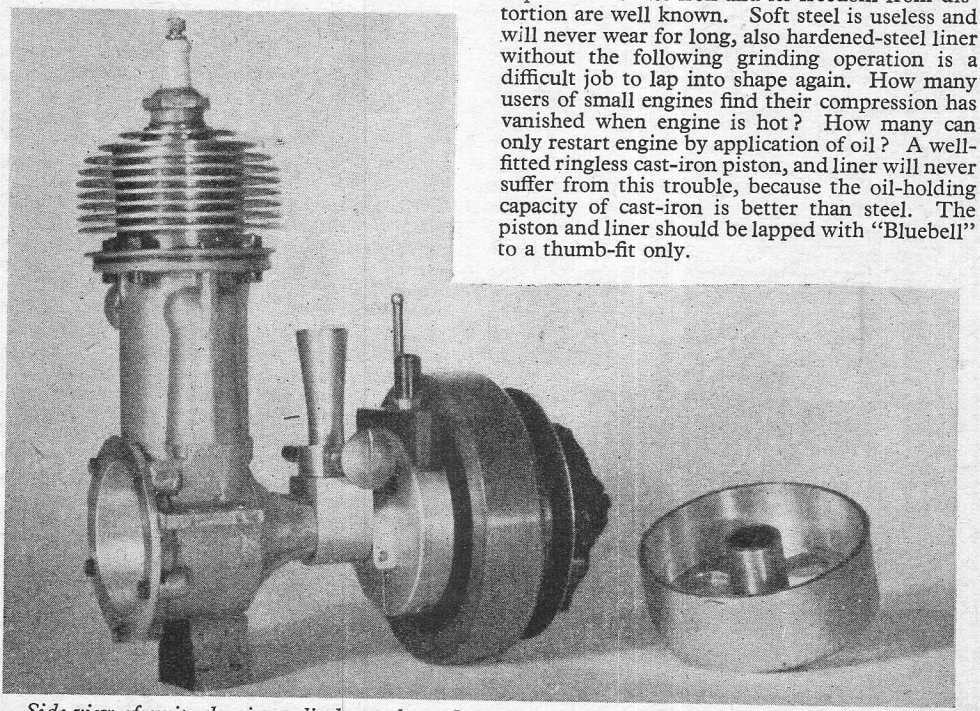
The inlet is milled down side of cylinder casting opposite exhaust port, the cylinder liner forming the division to crankcase proper. Here again, we do away with slotted pistons, brazed-on transfer, and exhaust ports, an endless source of misery to those who have made them.

In conclusion, I did not core the crankcase or cylinder on the final casting. When trying to core the die I found the metal swirl, due no doubt to gravity filling, spoiling the look of the casting; I therefore, made the casting solid and machined surplus metal out afterwards.

So remember two points. If the casting does not take the complete shape of die, an air-hole is necessary at the point, and if the casting locks in die, it is due to insufficient backing of die or file mark against direction of casting draw, and finally, keep the die evenly heated before pouring metal.

Cylinder Liner

Cast-iron with 1/32-in. walls and flange 1/32 in. thick. This locates with flange at top of aluminium cylinder barrel, immediately above exhaust port. The circular finned head is also flanged, locating above the others; the three locked together by four nuts and bolts. By this method the liner cannot shift and we suffer no more from stripped studs in aluminium crankcase, etc. The low expansion of cast-iron and its freedom from distortion are well known. Soft steel is useless and will never wear for long, also hardened-steel liner without the following grinding operation is a difficult job to lap into shape again. How many users of small engines find their compression has vanished when engine is hot? How many can only restart engine by application of oil? A well-fitted ringless cast-iron piston, and liner will never suffer from this trouble, because the oil-holding capacity of cast-iron is better than steel. The piston and liner should be lapped with "Bluebell" to a thumb-fit only.



Side view of unit, showing cylinder and crankcase inlet with centrifugal clutch drum removed

Piston—Ringless Cast-iron

Fabricated cast-iron shell with aluminium deflector top shouldered and screwed into aluminium gudgeon-pin support block. The gudgeon-pin is not carried through piston shell, the ends of gudgeon-pin are curved to fit inner diameter of piston, preventing unnecessary turning of gudgeon-pin, in support block. Result, almost as light as aluminium piston, as good a conductor of heat, far better wearing qualities, and no piston rings to worry about.

Connecting-rods

Phosphor-bronze throughout. Stands up to wear far better than aluminium-alloy type. A petroil system is not very kind to aluminium-alloy rods, although reasonably successful with four-stroke type engines.

Crankshafts

Balanced-disc type, material K.E. 169, hardened and ground, fitted with left-hand threaded hollow crankpin, also K.E. 168, $\frac{3}{8}$-in. diameter bearing drilled $\frac{1}{4}$ in. diameter for rotary valve. Crankshaft bush is phosphor-bronze $1\frac{3}{4}$ in. long. No oil grooves are necessary, the bush is entirely self-oiling through rotary valve inlet.

Venturi Tube Jet, Needle and Needle-guide

My own design gives an almost foolproof start. The venturi tube is aluminium, $\frac{3}{8}$ in. at mouth tapering down to $\frac{3}{16}$ in. at jet-needle guide body, opening out again to $\frac{1}{4}$ in. diameter at rotary-valve inlet; the unit being screwed into banjo body embracing crankshaft boss on crankcase.

Testing

Ran in four hours by belt and electric motor, running at 1,420 revs. per minute. When placed on petrol test, engine started third pull, given ten minutes' run, then tested by revolution counter at 7,200 revs. per minute. Weight of flywheel, centrifugal clutch and drum = 14 ozs.

I am hoping to have this engine on the track for miniature car racing this season, the chassis being now well in hand. The weight of the engine is $9\frac{1}{4}$ ozs., complete with contact-breaker and split-taper collar cam, but less flywheel centrifugal clutch and drum.

In conclusion, there is no reason why a model engine of this type should not stand up to the same wear as the ordinary motor-cycle type of engine. The day of the strip tin connecting-rod and cylinder ports $\frac{1}{4}$ in. out of position should no longer be tolerated by the model engineer.

Clocks at the "M.E." Exhibition

By W. L. RANDELL

THE builder of model engines regards the man who makes clocks in his spare time with a kind of humorous, indulgent despair. "Why on earth do you want to bother about making a clock," he asks, "when you can buy one that will keep better time?" To which the unperturbed clock-addict retorts, "Why build an engine that doesn't *do* anything and can only be looked at?" The rather nasty one about keeping "better time" he ignores; the insinuation is beneath his notice.

Who shall judge between them? And, anyway, putting it baldly, what does it matter, this amiable argument, as long as both are happy? Engines of many types no doubt predominated at the Exhibition; but for many years clocks designed and constructed, or modelled and constructed by enthusiasts, have found a place there and have won distinction. This year the fine Congreve clock, made by A. H. Nettleton, was the focus of an admiring group whenever I passed it, and it was well worth the admiration. Sir William Congreve himself, that prolific inventor, who patented his clock that measured time by the movement of a ball on a rocking inclined plane in 1808, would have congratulated this exhibitor; and to construct the replica without drawings was something of a feat.

A seconds' pendulum electric clock, by C. Aldham, attracted me with a special pull, probably because many years ago I made one myself on the same principle—that of the trailing-trigger contact which supplies an impulse to the pendulum as the arc of its swing lessens. The contact-board of this clock was a fine piece of work, admirably finished, and the whole action had that decisive character which pleases the critical eye. Clocks of this type are not difficult to make, and provided that the pendulum does beat seconds they are bound to be pretty good time-keepers; but not often is so much care taken to make a first-class job as was evident with this one.

A similar high standard was set by the more complicated eight-day striking and chiming clock, fusee-driven, by C. B. Reeve. Probably few modelmakers would be able to spare the time to construct a clock of this type. But one never knows . . . one of my own clocks, proud winner of a bronze medal at a MODEL ENGINEER Exhibition, was made by the fireside on winter evenings (by permission of the home authorities) with a newspaper spread on the carpet to catch the filings. Another ingenious exhibit was the fourteen-day clock with an old verge movement as speed controller, by D. M. Picknell. A comment that occurs to me, suggested by this clock, is that modelmakers who are interested in time measuring mechanisms might, instead of copying existing types of clock, turn their attention sometimes to the art of adaptation and combination; quite a lot of fascinating possibilities can be found with old watch and clock movements plus a little original thought.

However, those who exhibited on this occasion may rightly feel that they made excellent contributions to the success of the first post-war Exhibition, and are to be cordially congratulated.

Ship Modellers' Corner

By Edward Bowness

Completing the rigging and details of the rails for the model 4-mast barque "Archibald Russell"

TO complete the rigging the spanker boom and gaff should now be fitted. Their length and diameters are given in Fig. 63, in the issue for August 1st, and they should be made of the same material and in the same manner as that described for the yards. To secure them to the mast, break the point off a fine needle for a length of 3/32 in. and press the broken end of the fragment into the butt end of the spar, leaving the point projecting for about half its length. The gaff should be fitted first. Referring to the Rigging Plan, Fig. 60, in the issue for June 13th, press the point of the needle into the mast at the position shown and attach the topping lifts (54), which were left hanging from the clip at the jigger mast cap, in such a way that the spar is at the correct angle, as shown in the drawing. The upper of the two topping lifts should be continued down to the boom, which may now be fitted, thus becoming the boom topping lift (53). The boom is secured to the mast by the point of the needle in the same manner as that described for the gaff. The spanker sheet (56) is double, the lower blocks being shackled to the poop deck near the rail, one on the port side and one on the starboard. The vangs (55) are also double, and should be secured to the deck near the rails, one on each side.

The railings around the poop and fo'c'sle head have been left until now, as they are apt to be in the way when fixing the rigging. The stanchions are made of fine wire cut into $\frac{1}{4}$-in. lengths. Thirty-one will be required for the poop, and twenty-two for the fo'c'sle head. Their positions are shown in the plan of the deck fittings, Figs. 10 and 13, in the issue for June 7th, 1945. A small hole should be made for each, using a needle or a fine pricker, when they may be pressed in by means of the jig shown in Fig. 43 in the issue for December 27th. 1945. This automatically regulates the height, which should be $\frac{3}{16}$ in. above the deck. They should be vertical and not necessarily at right angles to the deck line.

The rail around the poop is made of copper wire, 20 s.w.g., which will, of course, be tinned before soldering to the stanchions. After soldering in position the tinning should be scraped off the upper and outer surface, showing the natural colour of the copper. This will tone down in a few weeks until it has the appearance of the mahogany rail. Care must be taken to avoid burning the jigger mast shrouds and backstays when soldering, and a soldering iron (not a blowpipe) and a steady hand are essential. If the mizzen braces are already in place they should be removed whilst the soldering is in progress. Perhaps the easiest way will be to remove the bumkins with braces attached and to re-insert them when the soldering is finished. This point should have been made when

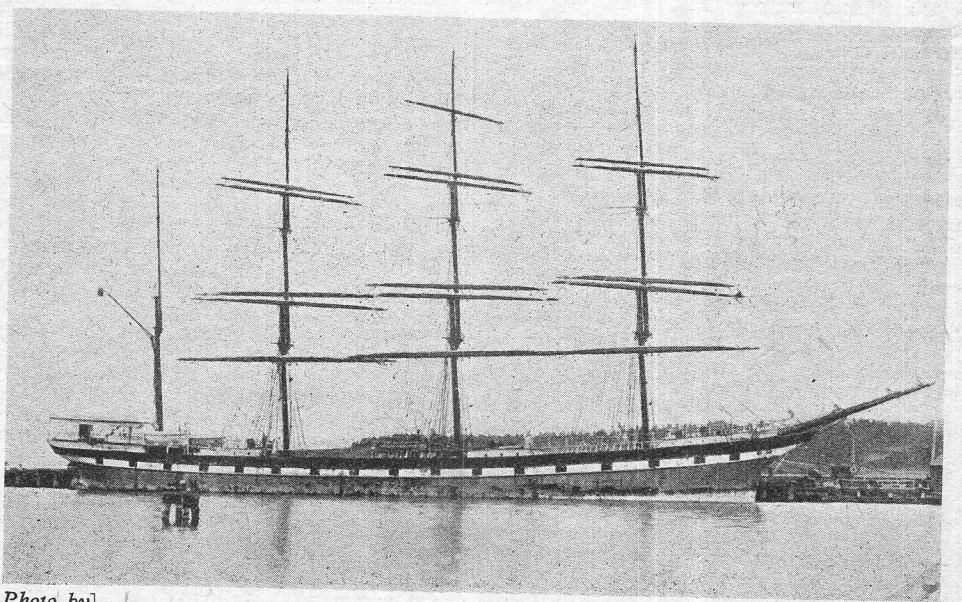


Photo by [*Nautical Photo Agency*

"Archibald Russell" with painted ports and furled sails

describing the mizzen rigging and I apologise for the omission.

From the plan, Fig. 13, it will be seen that the railing on the fo'c'sle head passes round inside the lighthouses, and that it is in two portions, being divided just above the bowsprit. This is clearly shown in the photograph on page 319 of the issue for March 28th. The wide spacing between the stanchions in the photograph and the omission of the lower rail is to facilitate the handling of the anchors. Both the poop and the fo'c'sle railings have two additional rails below the topmast rail. These can be represented by running fine threads around and gluing them in position. As an additional refinement a fine cord or a strip of Bristol board, 1/32 in. wide, should be glued around the poop, just outside the base of the stanchions, as shown in Fig. 10, already referred to.

Finally, the ensign halliards (67) and the flag halliards (66) should be fitted. Actually they are double, but unless the very finest silk is used, they should be single cords, as otherwise they are too obtrusive.

We publish this week a photograph of the *Archibald Russell* which shows her with painted ports and the sails furled. She is not quite down to her Plimsoll marks, and her sides show signs of having seen some service since she was painted, also her fore royal and mizzen royal yards are down on deck; but she was in her prime when the photograph was taken, and it was this period in her career which we have chosen to represent in our model.

If the model has been made with a full hull and is intended to be shown without sails, it is now complete. All that remains to be done is to make a stand to support it, and a case to protect it from dust. The simplest type of stand is that shown on page 112 of the issue for February 1st, 1945, but if something more elaborate is required it may be safely left to the discretion of the builder. My personal feeling is that the stand should be simple and secure. The type of stand where the ship is supported on two posts under the keel always makes me feel nervous, although I admit it does exhibit the underwater form without any interruption. However, everyone to his taste. The same remarks apply equally to the case. Some people object to putting a model in a case, but I am sure they are wrong. Nothing can prevent dust settling on a model, and sooner or later the model loses its freshness; then there is the certainty that the rigging, if unprotected, will deteriorate and receive damage. The case should not be too close a fit for the model and the framework should be as light as possible. I heard recently of a case where the glass was ground to a 45 deg. bevel where the edges met and then cemented together without any framing whatsoever. That is the ideal, and the nearer one approaches that the better.

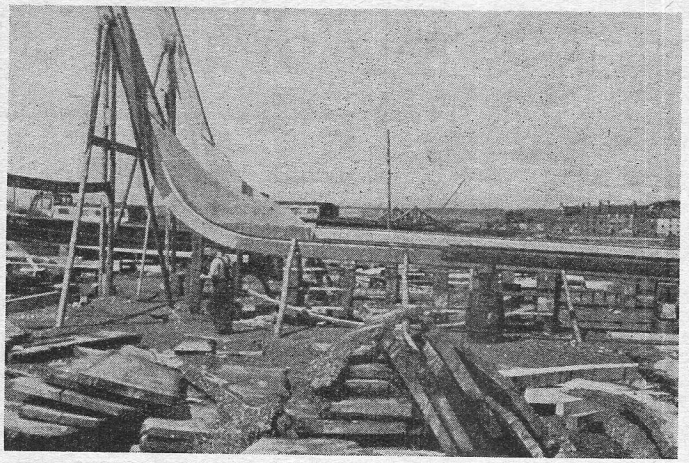
Speaking of cases reminds me of a letter I received recently and which contains a warning I would like to pass on. Here is the extract:

"My 50-ft. to the inch *Archibald Russell* has met with a severe setback due to my own crass stupidity. I finished her last Tuesday, and she looked good. (Having seen some of the correspondent's work, I am sure she would look good.) I proceeded to mount her on a plaster sea, painted the sea, and with a sigh of relief put the glass cover over her. When next I looked at her, some hours later, I nearly wept. The sails were limp, the sheets slack, the masts bowed back, the port boat had fallen away from the davits, the flying bridges were down to deck level between the stanchions, and sea had broken up. In my anxiety to cover her up before any damage occurred, I had not waited for the plaster and paint to dry, and thus the air in the case became super-saturated, and then trouble began."

Shipbuilding in Wood

As is my custom, I had taken a few recent issues of THE MODEL ENGINEER with me on my holiday, for a more careful reading. The day previous to my reading Mr. T. L. Wall's description of his lovely model of H.M.S. *Portland*, I had been in Montrose and had noticed that they were building several motor fishing vessels in the old shipyard on Rossie Island. It was then too late for visiting the yard, but a few days later I called and found everything as Mr. Wall had described it—he might have had Montrose in his mind when writing. There it was, the lovely situation and wooden ships in all stages of construction. Two had their keels in position with stems and sternposts fitted, others were in frame, and one was in the early stages of planking. The accompanying photographs will give some idea of the kind of work which was in progress. Lying around in the yard were stacks of timbers of every conceivable shape, some sawn in slabs of about a foot in thickness, all ready for selection and marking out. Others were already sawn to shape. It brought back memories of my boyhood on the Cumberland coast, and of an old shipyard where coasting schooners were built of wood. The principal difference was that, whereas in the modern yard the fastenings were of steel galvanised, in the older yard treenails, or "trennels" as they were called, were used. I remember well the appearance of the hulls just before they were finished, when the entire surface was studded with trennels 1 in. to 1½ in. diameter, which protruded an inch or so above the surface. These were finally driven in flush just before painting, or if this was impossible they were cut off flush so that the surface was smooth and true. In the modern wooden vessels the bolt heads are sunk below the surface and the recess filled with a plug of hard wood.

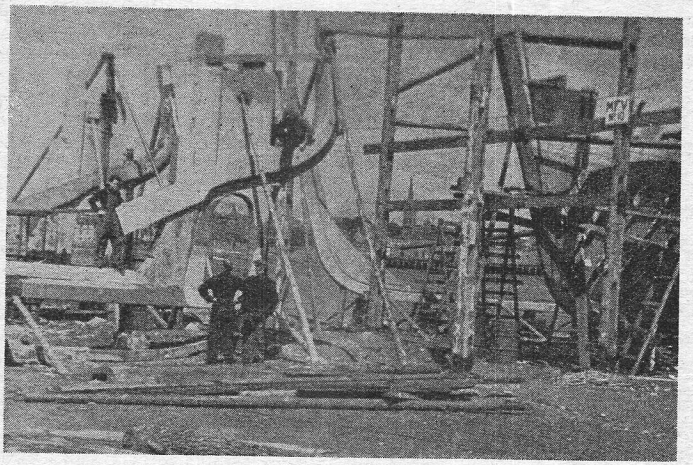
The wood used in both the new ships and the old was chiefly oak, and there was certainly plenty of it, especially along the keel and at the angles with the stem and sternport. It is only when one has been to sea in a small ship in a heavy gale, and has actually experienced the buffeting the ship receives, that one realises the necessity for such strength of construction. I once crossed the Pentland Firth in a small steamer under such conditions, and the expression "Shiver my timbers" has ever since been associated in my mind with the experience. The ship literally shivered throughout its length as, every now and then, a wave bigger than usual struck her on the port bow.



First stages, showing stem and keel

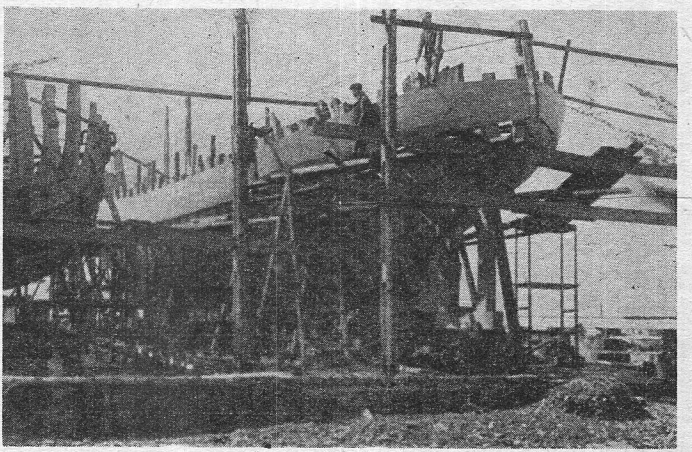
men working on a wooden ship during the war.

I missed seeing the manager, but the man in charge of the office and the yard foreman were most helpful. I was shown the drawing office where the sections of a large motor fishing vessel were being laid out, also the construction plan. There was a half model of one of the hulls, made in layers, from which the water lines of the vessel could be studied. Many years ago I applied by letter for a job in this same drawing office, but business was declining, and there was no reply. I saw the mould loft, but time was pressing and I was unable to stay to go in.



Stems and sterns

The shipyard at Montrose used to build fishing and coastal craft, first in wood, and later in iron, up to about twenty years ago. For some years the yard was dormant, but recently it was taken over by an Aberdeen firm, J. V. Hepburn & Co. Ltd., for the building of motor fishing vessels, of Government design. There was evidently enough experienced labour in Montrose to get the yard going again, and judging from appearances, the younger men are keen to learn the craft. One I saw using an adze, a tool I haven't seen used for many years, except on one occasion when I was in Brixham and saw



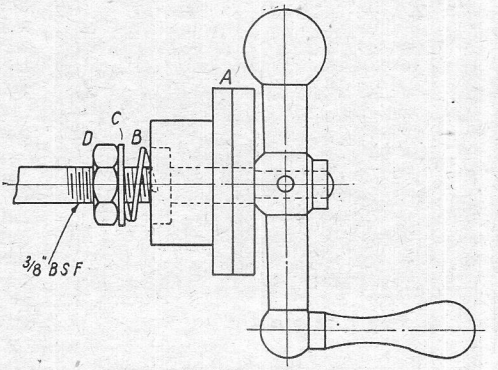
Sterns, showing planking in progress

A CROSS-SLIDE DIAL

By H. C. Taylor

FOR some time, I intended fitting a graduated dial to the cross-slide of my lathe, At last, being thoroughly tired of chalk lines, and guessing at thousandths, which were generally wide of the mark, I started on the job, and had the work finished in a few hours.

It may be of interest to describe the dial, and the method used to graduate it. The dial itself is a straightforward lathe job ; it consists of a disc reduced in diameter at one end. The smaller end has a shallow recess. The dial is bored axially to fit the tail end of the slide screw, and should be a nice fit ; it should turn easily, but must not be sloppy, and is shown at *A* on the drawings. The remaining parts are, a double helical spring washer *B*. A standard $\frac{3}{8}$-in. washer *C*, and a $\frac{3}{8}$-in. B.S.F. nut *D*. The tail end of the slide-screw must be threaded for a sufficient length to take all these parts. A glance at the assembly drawing shows the order in which these items are arranged.



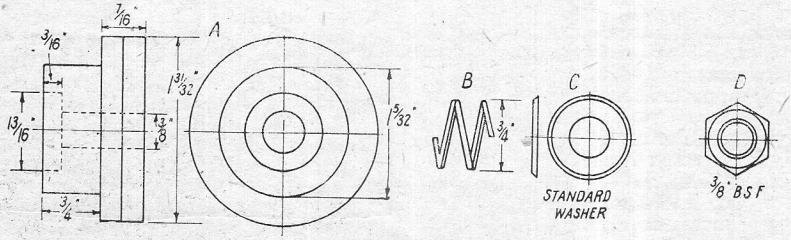
Dial assembly

The front of the dial butts against the screw handle. Pressure is put on the spring washer, *B*, by turning the nut, *D*, until the dial can be turned easily but is sufficiently stiff to be immovable against an accidental knock or touch. I have not found any positive locking device to be needed.

Some lathes, especially the older ones, are fitted with loose detachable handles. In this case, the handle must be made a fixture by pinning, or other means. If it is desired to retain the loose handle, a fixed collar, or a nut must be inserted between the handle and the dial face.

Graduating

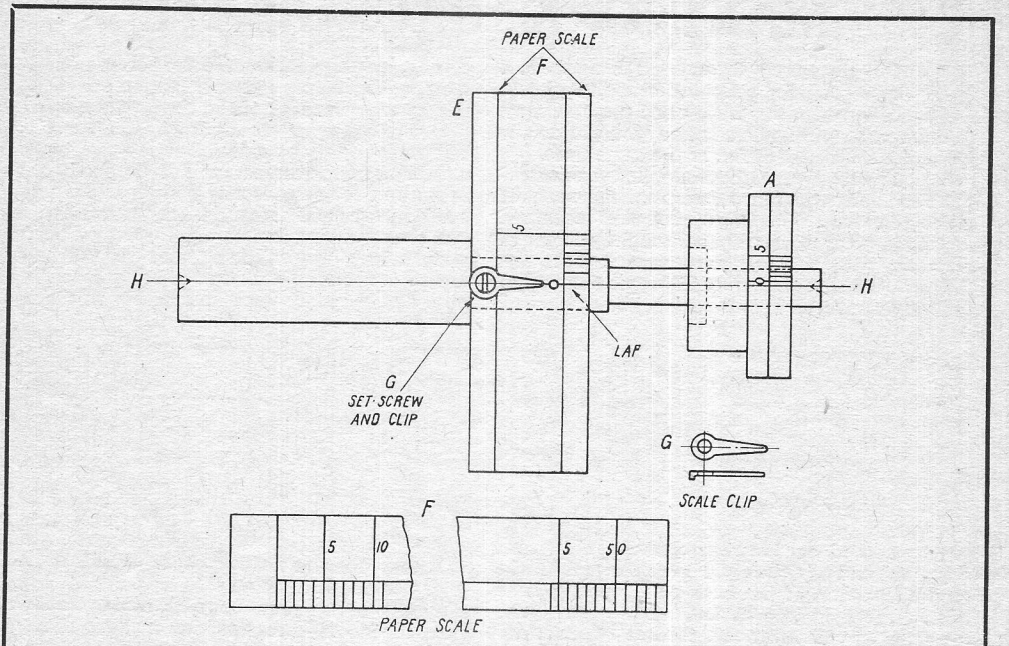
The method I used for graduating the dial is based on the fact that, while it is an exceedingly tedious and uncertain process to divide a circle into any given number of equal parts, it is fairly easy to do so with a straight line. It will, perhaps, be easier if I describe the very simple apparatus required first, and then go on to the graduating later. A disc with a wide rim, *E*, is fixed solidly to a mandrel *H*, centred at both ends. The front end of the mandrel is turned down to be a tight fit in the bore of the dial *A*. Close to the back edge of *E*, a small hole is drilled and tapped for a small screw ; say $\frac{1}{8}$-in. Whit. or other suitable size, shown at *G*. A clip is filed up out of a bit of sheet metal about $\frac{1}{16}$ in. thick, and a clearance-hole drilled to suit the screw *G*. Before drilling and filing up the clip, bend the metal at right-angles, at the hole end, and then file off the turned-up portion, so as to leave a slight heel. A glance at the sketch of the scale clip, will show this. I have not given any dimensions of the clip, as its length will be governed by the width of the rim of the disc *E*. The disc should have a rim about $1\frac{1}{4}$ in. wide or more. The diameter should be as large as can be conveniently handled in the lathe, and must run true on the rim. If necessary, skim up on the mandrel. I used an old sack truck wheel for the disc. I have not given any dimensions of this rig-up, as obviously, nearly everything depends on the material used for the disc. A rough guide, however, is that the wheel used in the sketch is $3\frac{15}{16}$ in. in diameter.



Dial components

The Zero Line

A ribbon of thin smooth-surfaced paper is now cut, long enough to go once round the circumference of the disc, plus about half an inch overlap. It should be narrow enough just to miss the set-screw *G*. Cut the ends square. Coil the strip round the rim, bringing the join under the



Graduating rig

clip, and tighten the screw. See that the paper lies evenly and tightly on the rim ; then, with a fine-pointed pencil, run a line along the overlapping join. This gives the zero line, and the start of the graduations.

Remove the paper, and pin it on the drawing board. With the T-square draw a horizontal line about half-an-inch from the lower edge of the paper. With the dividers, starting from the zero line, proceed to step out the number of divisions required, along the horizontal line. Take time over this and get the divisions accurate. Remember the accuracy of the dial depends on the accuracy of the paper scale. If the number of divisions is one that can be halved, say, for instance, 50, it will only be necessary to go over half the number of divisions to obtain the correct spacing. In my case, I had to divide the scale into 125 parts, a somewhat tedious job.

Drawing the Lines

As soon as an accurate division is obtained, proceed to draw the vertical lines. The first, or zero, line is already drawn across the full width of the strip. Now draw four short lines, from the horizontal line to the bottom of the paper. The sixth line is a long one, and go on in this way until the strip is filled. Make every sixth line a long one, counting the previously drawn long line as number one, each time. Replace the paper on the disc, put the mandrel on the centres, and tighten the tail stock until the mandrel turns very stiffly. Rig up an indicating point on some convenient part of the lathe. This point must be at exactly the same height as the lathe centres, and just clear of the proper scale. I used a surface-gauge, clamped to the saddle. Grind a screw-cutting tool to a sharp point ; clamp it on its side, with the cutting edge facing the headstock, in the slide rest ; adjust the tool till the point is at centre height, and feed it up to the dial until it cuts a fine, but distinct line. The cut is made, of course, by moving the saddle, and not by rotating the headstock. Arrange the positions of the pointer and the tool in such a way, that the pointer is just at the start of the scale while the tool is just clear of the dial front. I omitted to say that the dial should have a fine line cut round the centre of the rim, but this is clearly shown in the sketches.

Operation

Having pointer and tool properly adjusted, turn the scale until the zero line is exactly opposite the pointer. A carrier on the rear of the mandrel is a help in this. Now feed the saddle forward until the tool has passed across the dial ; bring the saddle back, and a fine clear line should result. Now rotate the mandrel until the next division line is exactly opposite the pointer, and move up the saddle again ; but, this time, it should be stopped when the tool has reached the centre-line of the dial. Proceed in this way until all the divisions are completed. The dial can now be removed, and the figures clamped. The job is now finished, and ready to assemble. Some critics may condemn this crude and unscientific method of calibration ; but " the proof of the pudding," etc. ! Some years ago, I used this method to drill a series of holes in three division-plates, for use on a standard type of dividing-head I had constructed. This tool was used for gearcutting, cutter making, graduating circles, and various other jobs, with perfectly satisfactory results.

MAKING A BACK-PLATE

DON'T get scared if you need to machine a back-plate for your self-centring chuck. It is recognised as a skilled piece of work to do accurately, but here is how you can do the job and have plenty of fun at the same time.

As you know, every lathe is supplied with a face-plate and herein lies our salvation and the means of making a hard job both easy and accurate. Procure a piece of round stock, slightly larger in diameter than the full measurement over the threads of the mandrel-nose and some 6 in long; carefully centre both ends so that the machining

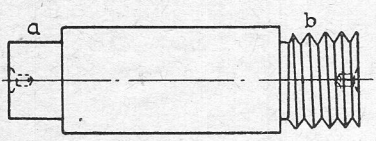


Fig. 1

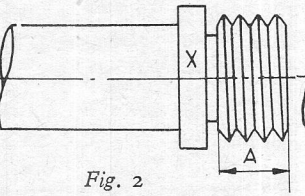


Fig. 2

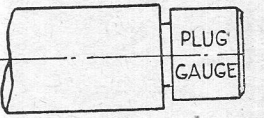


Fig. 3

can be carried out between centres. Now turn down one end so that it will enter a nice fit in the screwed portion of the back-plate; having done this, reverse in centre and turn down same diameter as that over the threads of mandrel-nose—careful measurement with callipers or micrometer here, please—then screw-cut same threads as nose. We should then have a mandrel as Fig. 1, "a" being a plug-gauge for the core of thread and "b" being a screw-gauge for the thread.

On some lathes—Drummond Type M—there is also a locating-piece, as Fig. 2, part marked X in this case.

In this case a further gauge will be necessary, and this can be made by turning down a piece of stock to a nice fit in part of faceplate marked X 1 (Fig. 4). Care again, please, as on this depends the accuracy of the chuck when screwed on the lathe. Don't be tempted to make all these gauges in one, which would amount to a replica of the nose, for it is these separate gauges that make the job easy and accurate, meaning that you can look after one measurement at a time.

Next job, mount casting on face plate—there won't be any difficulty here. Three plates with hole through and three nuts and bolts, but remember to pack up the casting on the face-plate to enable boring and screw-cutting tool to run straight through. Centre up boss to run truly, put in back-gear and take a surfacing cut across boss, get well under skin with first cut. Poke a drill through from drill chuck in poppet (with apologies to "L.B.S.C.") enlarging with boring tool to a nice sliding fit for part marked "a" in Fig. 1. Now the boring tool is in the tool-post, if there is a shoulder on the mandrel bore out to this diameter, using gauge, Fig. 2, bore out until nearly size then measure width of shoulder at X on Fig. 2—this is not important and can be a little deeper than required.

Now we are all set for screw-cutting, set up change-wheels for required number of t.p.i. and cut deep enough for the screw-gauge already made to go nicely in; a little play here is not a serious matter, but be sure the recess taking the locating shoulder is a good fit, for on this depends the accurate running of the chuck when fitted.

Before removing casting from faceplate remove the whole and try on mandrel-nose—caution here, a little oil on the threads, and do not force, or one or both of the threads may pick up, with serious consequences; if tight, replace on mandrel and run screw-cutting tool through again. This may seem a long way of doing the job, but it will assure accuracy. Remove casing and screw on nose and dress up back and boss; this can be done on most lathes with plate in normal position.

A few hints on fitting chuck. Width 2 "A," Fig. 5 about $\frac{1}{16}$ in. more than length "A," Fig. 2. This will allow trimming up the face to mate with back of chuck—recess portion making diameter "b," Fig. 5, a good fit. Much care is needed here, for on this part depends the accuracy of the chuck registering with plate. Leave a few thousandths of an inch between "a" and chuck in order that it may seat against portion "b,"

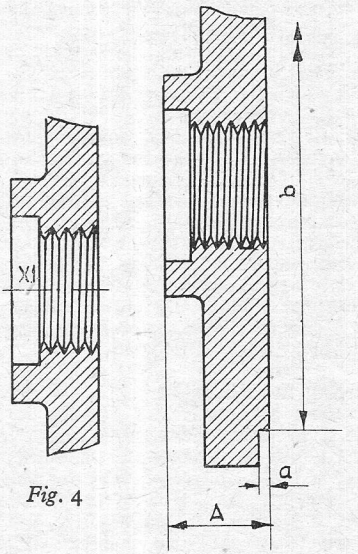


Fig. 4

Fig. 5

Fig. 5. There now only remains to drill and tap the three holes for the screws, which is quite a straightforward job, but needs accuracy to avoid distortion.

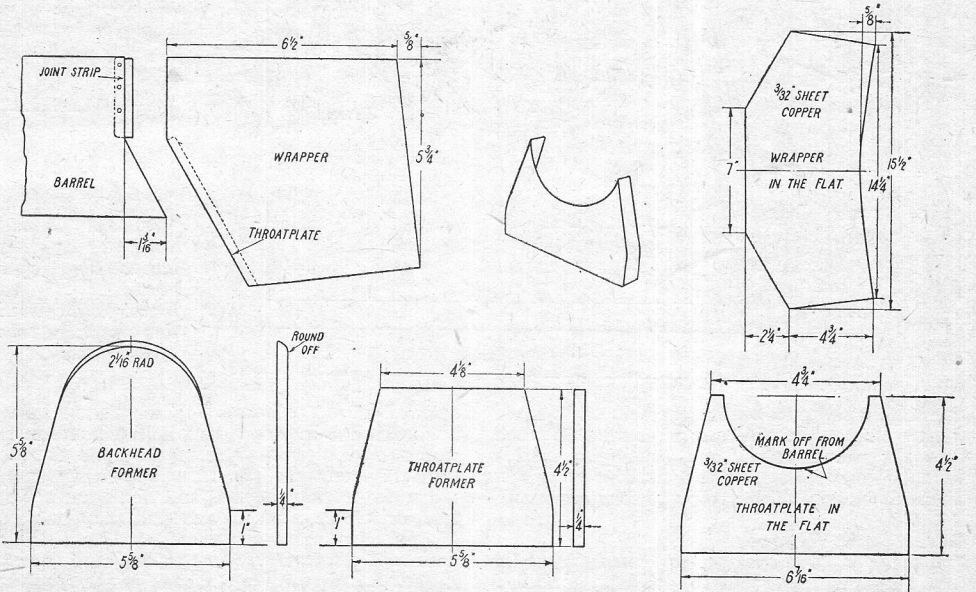
Your back-plate is now complete and ready for use. Oil and carefully put away gauges used in the making.—"TOOLMAKER."

"L.B.S.C."

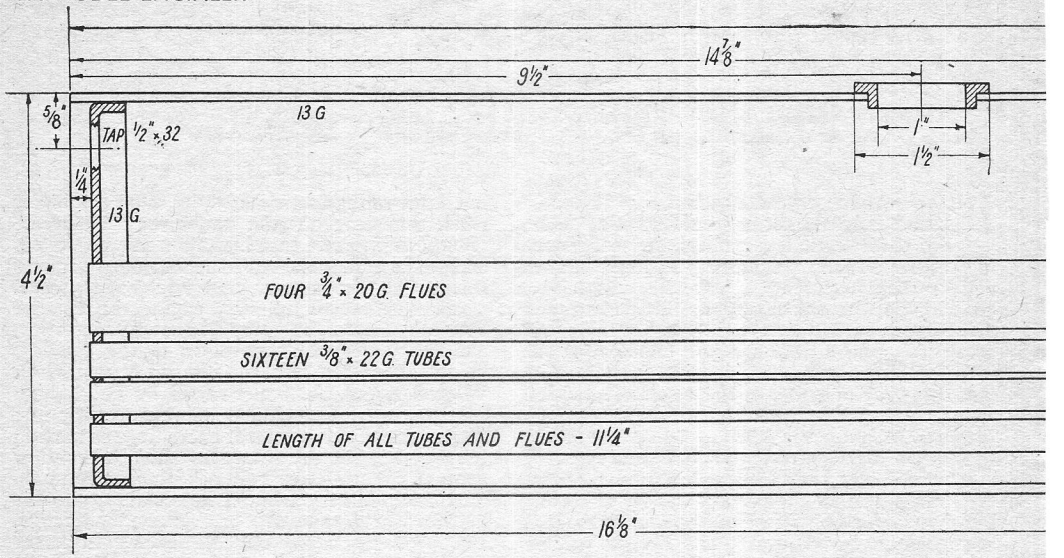
BOILER FOR "HIELAN' LASSIE"

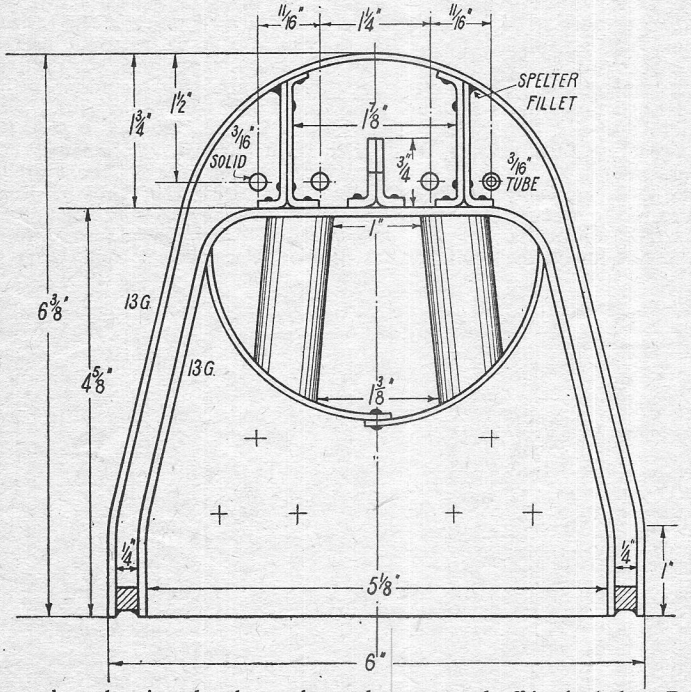
IN the introductory notes about the "Lassie," I said that the kettle would provide steam for three cylinders under any conditions of working. If any "Doubting Thomas" didn't believe that statement, I hope he will take a good look at the accompanying illustrations, and then maybe he will be convinced that there will be all that, plus a little to spare for blowing the whistle! For new readers' benefit, I might state that this type of boiler is the result of practical experimenting; and every one of the type which I have built, has never failed to deliver the goods. In the little dissertation about Nicholson syphons, I explained how the old-time locomotive engineers, realising that the firebox was far and away the most valuable part of the boiler for making steam, endeavoured to get more firebox volume by extending the upper part of it into the boiler barrel to form a combustion chamber; and in "Lassie's" boiler, the same wheeze is brought up to date. The six water-tubes serve a triple purpose; they act as very substantial stays, add considerably to the heating surface, and keep the water circulating vigorously. The first locomotive to which I fitted this type of boiler, was my four-cylinder 4-12-2 "Caterpillar" in 1926; and after twenty years of service, it steams as well as ever.

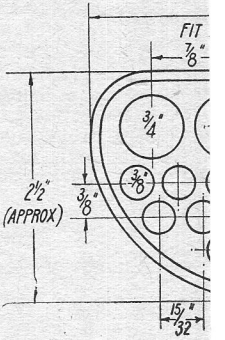
Second thoughts are best, says the old saw. It was my original intention to specify a tapered shell made to the "scale" dimensions of the boiler of the full-sized engine outside the lagging; but I hit up against exactly the same trouble as when scheming out the boiler for "Petrolea." Owing to the fact that Nature won't be scaled, and we have to make our little locomotive frames thicker in proportion, and use wider wheel treads, than on the full-sized engine, the distance between frames is proportionately narrower, and the boiler won't sit down to the "scale" height above rail level. This didn't matter on "Petrolea," as the boiler could be raised high enough to clear, without either spoiling the appearance of the engine, or exceeding the loading gauge; but on the "Lassie" it is a horse of another colour. Her boiler is practically up to the limit in full size; and if we cock it up another half-inch or so, she will be over the load gauge, and probably cause our old friend Inspector Meticulous to call for a large brandy, as an antidote for the shock he would get. After stirring up the grey matter a little—or rather what is left of it—I find that the easiest way out of the difficulty is to make the barrel parallel, and use a taper lagging on the part that shows above the frames. By this means, we need only raise the boiler centre by $\frac{1}{8}$ in., which isn't noticeable, and the correct appearance of the boiler is maintained. Incidentally, this saves a circumferential joint in the barrel, and the trouble of tapering the centre portion, so that the boiler will be easier to construct. I have also reverted to my original form of construction, as in the "Caterpillar's" boiler, by specifying



How barrel and wrapper are joined—View of throatplate—Details as noted on sketches





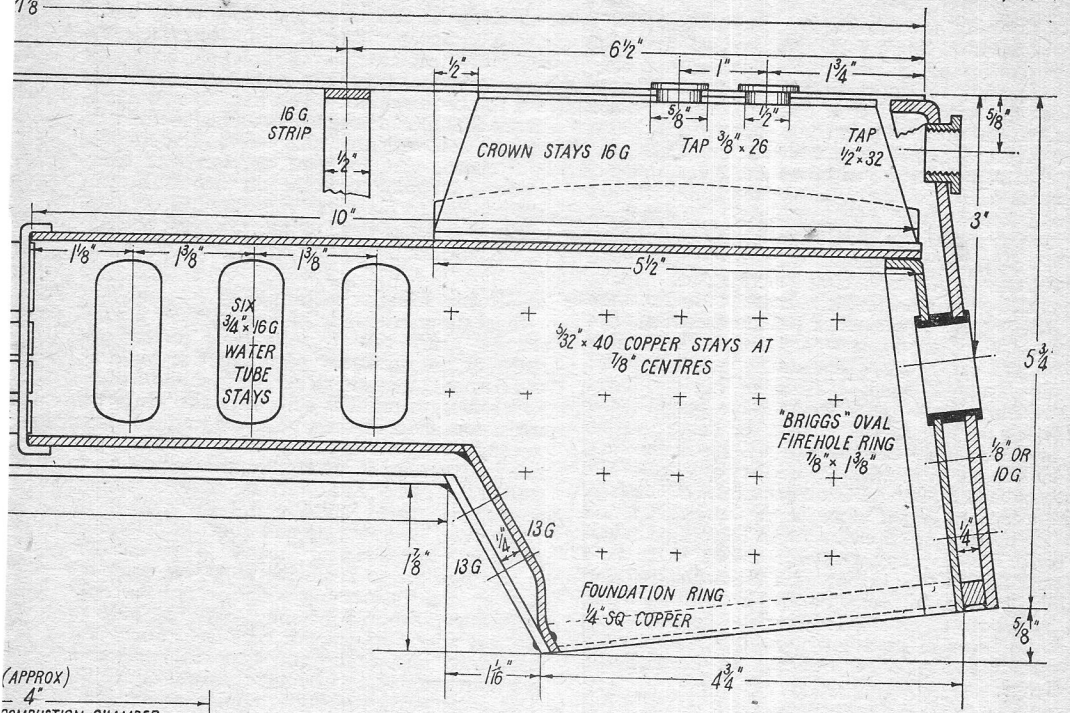


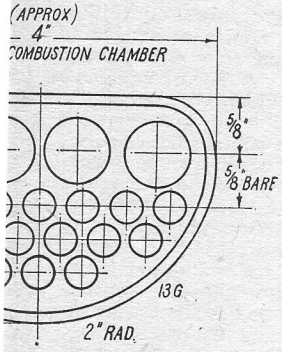
"Hielan' Lassie" boiler — longitudinal section, cross-section through firebox and combustion-chamber tube-plate

the firebox and combustion chamber to be made from a single sheet, instead of using a flattened tube for the chamber, and brazing it into a suitably-shaped hole in the firebox tubeplate. So much for generalities; now to construction.

Barrel and Wrapper

A piece of 13-gauge (3/32-in.) seamless copper tube, 4½-in. diameter and 16¼-in. long, is needed for the boiler barrel. One end of this should be squared-off in the lathe. Beginners should drive a wooden disc into each end, hold one end in the chuck, and support the other by the tailstock centre. Don't run the lathe at turbine speed, use a drop of cutting-oil, and don't use a knife tool, or it will catch up and pull the whole bag of tricks clean out of the lathe. Use a round-nose tool set crosswise in the rest, and traverse it back and forth over the edge of the revolving tube.





Next, at 14⅞ in. from the turned end, make a vertical saw-cut half-way through the tube. Don't attempt to saw straight down ; with either a flexible steel rule, or a bit of thin strip metal with a straight edge, wrapped around the tube, scribe a line half-way around, and keep the saw-blade to it all the time. Then from the opposite side of the tube, make a diagonal sawcut to meet it, as shown in the detail sketch. Use a fine-tooth saw, for you'll have a few teeth missing if you use a coarse one ; also recollect that a brushful of cutting-oil makes sawing copper quite an easy job. If cut dry, it clogs the saw, and drags. If the sawcuts are at all ragged, smooth with a file.

The wrapper sheet is the next item. This is cut from 3/32-in. sheet copper to the dimensions given in the detail sketch, and bent to the shape of a tunnel. The round back should correspond exactly to the curve of the barrel. Cut a strip of 16-gauge copper approximately 7½ in. long and ½ in. wide, and bend this to a curve corresponding to the inside diameter of the barrel. Rivet it into the vertical part of the stepped end of the barrel by means of a few 3/32-in. copper rivets at ½-in. centres ; these are not needed for strength, they are merely to keep the strip in place, and hold the parts together whilst being brazed or Sifbronzed. Now butt the wrapper against the barrel, overlapping the projecting part of the strip, which should be half in the barrel and half in the wrapper. Rivet this in place also. Beginners please note : the strip should be held to the barrel by a toolmakers' cramp at each end, and the No. 41 holes for the rivets, drilled through the lot. Countersink them on the outside, and use a drop of cutting oil on both drill and countersink. Put a hefty bit of iron bar horizontally in the bench vice, to serve as a dolly, or holder-up, when hammering the rivets down into the countersinks. I am including these "'ints and tipses" at the express request of "Lassie" builders who are raw recruits and want to do their best, so I hope that more experienced members of our fraternity won't be too impatient ! Drill the holes in the wrapper ⅛ in. from the edge, about ½ in. apart, and countersink them, *before* placing the wrapper in position over the strip ; the holes will then guide the drill when drilling the strip with the barrel and wrapper butted tightly together.

Formers for Throatplate and Backhead

Both forming-plates, or "formers" as they are called for short, might as well be made at the same time. They are needed for the purpose

of forming the flanges on the backhead and throatplate. Some folk make their formers of hardwood, but I prefer metal, as it not only stands up to knocking about, but beginners especially will get better flanges. The sizes are given in the accompanying illustrations. Use ¼-in. iron or steel plate, which at first sight may seem formidable to saw and file; but it isn't, because if you use a coarse-toothed hacksaw, and keep it wet with cutting oil, pressing as hard as you can on the forward stroke, and taking it steady, the saw will just walk through the plate without trouble. After marking-out, make centre-pops all along the marked lines; they will be easier to see, when you are operating with the saw. I usually get plenty of smoke coming off the saw-blade when sawing out a former; old Curly still has a little of his childhood "Sunny Jim" left, after all these years! You won't be able to saw around the curve; so go as close as you can to it, in a few straight cuts, and finish with a file. Note the top edge of the backhead former isn't at right-angles to the face, on account of the slope of the backhead; and the obtuse-angled edge should be well rounded-off. In case any beginner thinks there is a mistake in the given measurements, making the formers too small, may I remind him that they have to be smaller than the boiler by two thicknesses of metal—that is, $\frac{3}{16}$ in. all around, thus allowing for the thickness of the shell and flange.

Throatplate

In the usual form of boiler construction, the throatplate has a semi-circular flange formed on it where it joins the barrel. In my form of construction, this is dispensed with, and the plate simply butted up inside, against the lower half of the barrel, a fillet of spelter or Sifbronze being run around the joint. The pressure in the boiler only tends to force the throatplate into closer contact with the edge of the barrel; so even if the joint was weaker than the metal—which it isn't, being stronger if properly made—there would be no fear of it giving out.

Cut out a piece of 13-gauge sheet copper to the dimensions given on the illustration; if not already soft, soften it by heating to red, and plunging into clean cold water. Then clamp in the bench vice alongside the former, and beat down the projecting edge of the copper, over the edge of the former, until quite flat. Before removing the plate from the former, clean the flange with a rough or second-cut file; the file scratches form a "key" for the brazing material. Put the flanged plate temporarily in position at the front end of the wrapper, and hold it tightly against the barrel; then run your scriber around it, to mark the location of the barrel on the throatplate. Remove the latter, and cut out the semi-circular piece, to within ⅛ in. of the scribed line. I cut mine out in two wags of a happy dog's tail, on my Driver jig-saw machine; but they can be cut by hand, using a metal-piercing fret-saw (coping-saw is the trade term) in an ordinary fret-saw frame. An "Abrafile" will also do the doings in fine style. Smooth out any saw-marks with a half-round file; clean the edges of the wrapper sheet, put the throatplate in position, and rivet the flanges to the wrapper by a few 3/32-in. copper rivets at ½-in. centres. Use No. 41 drill, countersink the holes on the outside of the wrapper, and hammer the rivets well down into the countersinks. The joint is now ready for the first brazing operation, and, all being well, we will deal with that next week. Experienced boilersmiths who have an oxy-acetylene blow-pipe and are going to do the job with Sifbronze, don't forget to file a vee right around the joint where barrel and wrapper meet, so that the Sif-bronze will fill it up and make a proper job.

A Simple Job for Beginners

Since the instructions for building the "Lassie" started, many new recruits have entered the ranks of the fraternity of locomotive builders, and naturally they are rather chary about tackling such a hefty handful as a first attempt. In many cases, too, even if they built the engine, there would be no place to run it, except on a straight line of about 50 ft. or less in a suburban back garden; a very unsatisfactory state of affairs, as nobody would build a full-size "A1" or "Duchess" to shunt up and down the platform roads at Kings Cross or Euston. They ask if it is not possible to sandwich in a few notes on how to build something which would not only be the rock-bottom of simplicity, but able to traverse curves of eight or nine feet radius, and haul, say, two adults and two children on a small non-stop line without getting out of breath. The gauge preferred is the now-popular 3½ in., which has ousted the 2½-in. from first place, on account of giving more room to work between frames, and being safer for kiddies to ride on.

Well, by kind permission of our worthy friend who wields the blue pencil (incidentally he hasn't worn an inch off his in over 21 years on my notes!) I think it could be managed. The best engine for the job, taking everything into account, would be a four-wheel side tank engine, with an open-backed cab. The frames can be simple, with straight top and bottom lines and no curves at all. Stock castings can be used for wheels and cylinders; and as the engine is intended to run on a continuous line (the smallest would be a circle of about 14-ft. diameter) she need only have loose eccentric valve-gear. With cylinders of the type used on "Maisie" and "Iris" there would only be one pin-joint between eccentric and valve, and so the valve setting would remain accurate indefinitely. A simple boiler something like "Rainhill's" could easily be made and fitted, and the one-piece cast smokebox as used for "Petrolea" would come in, saving a lot of work and eliminating a separate front and saddle. The whole bag of tricks could be built during spare-time evenings in a matter of a few weeks; and even anybody with a fully-equipped workshop and a long railway with big curves, might find such a simple and easily-made job a useful asset, as it could be used for "rough-and-tumble" work, amusing the kiddies, and saving wear and tear on more elaborately-made and finished locomotives. Anyway, all being well, as soon as I can get the outline and frame details ready, I will endeavour to squeeze them in between "Lassie" notes.

* MILLING IN THE LATHE

By "NED" **Section 3—The Vertical Slide**

A general review of the principles, appliances and methods employed for adapting the lathe for various types of milling operations

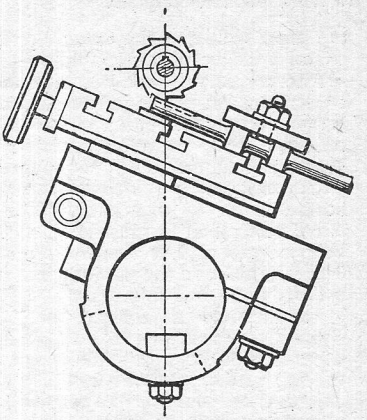


Fig. 26. Method of adjusting effective height of cross slide on 4-in. round-bed Drummond lathe

ALTHOUGH the principles of holding and setting-up work described in the previous section can be applied to many other operations than those illustrated, the facility and convenience of a working adjustment in a vertical or oblique plane will nearly always be apparent; and in many cases it becomes almost or entirely a necessity. For instance, it is commonly necessary to carry out a side-milling operation in which there is no clear path of approach to the cut, and the relative vertical position of work and cutter must be altered to clear an obstacle. This condition arises when side milling the flutes of a locomotive connecting rod, where only the portion of the rod between the eyes must be fluted, and the cut must run out on the radius of the cutter, adjacent to the bosses at each end. Clearly, an operation of this nature cannot be carried out without some form of vertical adjustment; in this case, the amount of movement required is quite small, but in other operations, it may be fairly considerable, up to a matter of one or two inches; beyond this amount, it is doubtful whether the small lathe, of the type commonly used for model engineering, is adequate to deal with the work.

Before describing the orthodox types of vertical slide, it may be noted that some lathes intended for the use of model engineers have incorporated means of adjusting the effective elevation of the cross slide to provide a certain range of vertical adjustment. The best-known example of this device is found in the 4-in. round-bed Drummond lathe, where the effect of swinging the saddle around the bed is utilised for this purpose. It will readily be seen, from the illustration shown in Fig. 26, that this is equivalent to swinging the headstock mandrel of the lathe in an arc about the bed centre; the highest position of the mandrel being obtained when the cross slide is at right angles to the connecting centre line between mandrel and bed centres. Any other position reduces the distance between

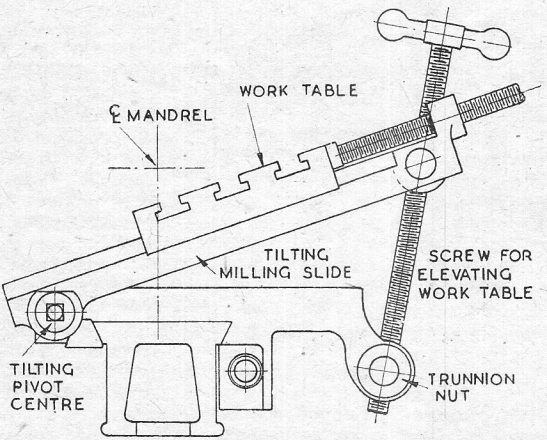


Fig. 27. Tilting cross slide provided for milling on Jackson-Rigby lathe

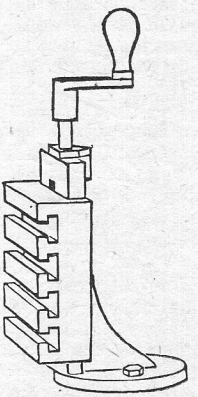


Fig. 28. Early type of Senior vertical slide without swivelling adjustment

*Continued from page 366, "M.E.," October 10, 1946.

the cross slide and the mandrel, constituting, in effect, a means of vertical adjustment.

Another very simple but ingenious cross slide adjustment was provided as an accessory to the Jackson-Rigby lathe, in which a special form of cross slide, complete with its slideway (or soleplate) and lead screw, was hinged to the saddle at the back, and provided with an elevating screw at the front, so that it could be tilted up to effect vertical adjustment (Fig. 27). It has often been suggested that a tilting cross slide table is impracticable, on the grounds that it will produce a taper cut; but this is only true when the tilt is applied to a separate and superimposed fixture, such as a sine table. So long as the plane of motion of the cross slide is kept parallel to the bolting surface, the cut will also run parallel to this surface, whatever the angle of tilt. Incidentally, this principle is applied to milling machine practice in the Kendall and Gent tilting-bed horizontal miller.

To avoid possible embarrassment to either manufacturers or readers, it should be explained that neither the Jackson-Rigby lathes nor the Drummond 4-in. round bed lathes are now in production, though a limited stock of spares for the latter is held by the Myford Engineering Co. Ltd., Beeston, Notts.

It is rather beside the point to enumerate the many elaborate devices which have been incorporated in lathe design at various times, such as elevating headstocks or vertical saddle slides, since very few readers will have access to lathes incorporating them, and those who have will probably be better instructed in their use than the writer.

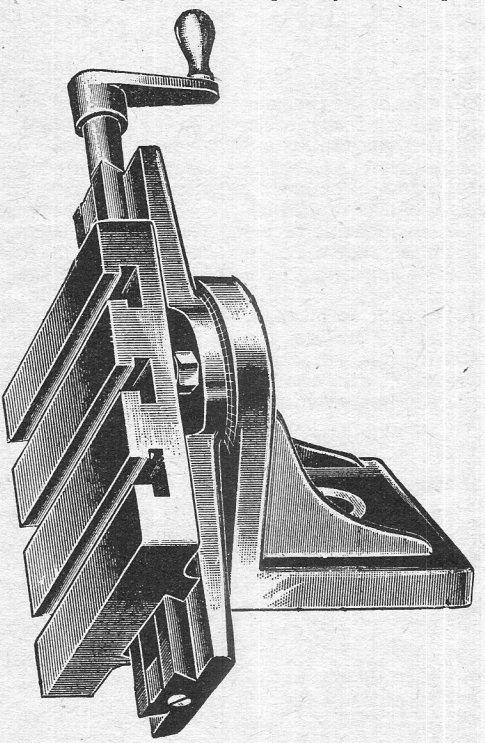


Fig. 29. Senior vertical slide, with horizontal swivel

The Vertical Slide

Apart from devices actually incorporated in the design of the lathe, the handiest attachment which can be fitted to an ordinary lathe, for the purpose of providing vertical adjustment, is the well-known "vertical slide." This device is produced by various makers of lathes and accessories, in a range of sizes to suit lathes from about 2½ in. to 6 in. centres, and in more or less elaborate and adaptable forms of design.

Basically, the vertical slide consists of a simple slide-rest, comparable to the normal lathe cross slide, and usually provided with tee slots or other means of holding work, which is attached to a right-angled bracket adapted to be mounted on the lathe cross slide, so that the plane of movement of the subsidiary slide is in a vertical plane. The base of the angle bracket is usually capable of being swivelled around a vertical centre pivot, and in some cases, the subsidiary slide can also be swivelled around a horizontal pivot. Slides thus equipped are capable of universal or "spherical" angular adjustment in any plane.

"Robbing Peter to pay Paul"

It may be mentioned that in some lathes, the advantage of the vertical slide has been obtained without the addition of a subsidiary slide, by the provision of a suitable bracket, mountable on the cross slide, and carrying the swivelling top slide in a vertical or angular plane. While this fitting may be found extremely useful in some cases, especially if the top slide is of ample size and equipped with tee slots, it may possibly restrict the scope of operations by depriving the lathe of one of its normal adjustments, or "robbing Peter to pay Paul." The position is somewhat different when an *extra* slide happens to be available for fitting up in this way; but generally speaking, a vertical slide specifically designed for its purpose is the more convenient and efficient.

Apart from the early use of these devices for ornamental turning, the makers of horological and instrument lathes were the first to realise the possibilities of the vertical slide, and nearly all well-known makers of precision lathes, for this class of work, listed vertical slides among their range of equipment. Among the pioneers in the production of vertical slides in this country was the late Mr. George Adams, and his beautifully-made products are often seen at work nowadays in the more elaborately-equipped model workshops.

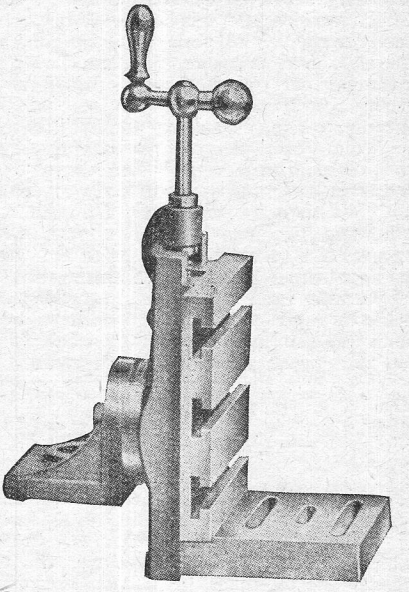
Somewhat more rugged, but none the less accurate, vertical slides have been manufactured for many years by Tom Senior, of Atlas Works, Liversedge, Yorks. The simplest form of fitting is illustrated in Fig. 28, and it will be seen that the upright member of the angle bracket forms the slideway for the vertical slide, so that the movement of the latter is restricted to a vertical plane in both sideways and crosswise directions. As mentioned above, however, the need is often felt for a swivelling movement of the vertical

slide about a horizontal centre, and this is provided by the swivelling type of fitting illustrated in Fig. 29. At the moment, the Senior slides are believed to be temporarily out of production, but it is hoped that they will again be available to model engineers in due course.

The latest Myford vertical slides are made in both swivelling and non-swivelling types, and are supplied with bases and swivels graduated in degrees, and screws indexed in thousandths of an inch travel. Other refinements in this make of vertical slide include a renewable nut for the lead screw, and large diameter friction pads for the pivot bolts, to prevent slipping of the swivel bases in use. These slides are designed primarily for use on the Myford 3⅛ in. and 3½-in. lathes, but can be applied equally well to most other lathes having a flat surface on the cross slide to enable them to be mounted thereon.

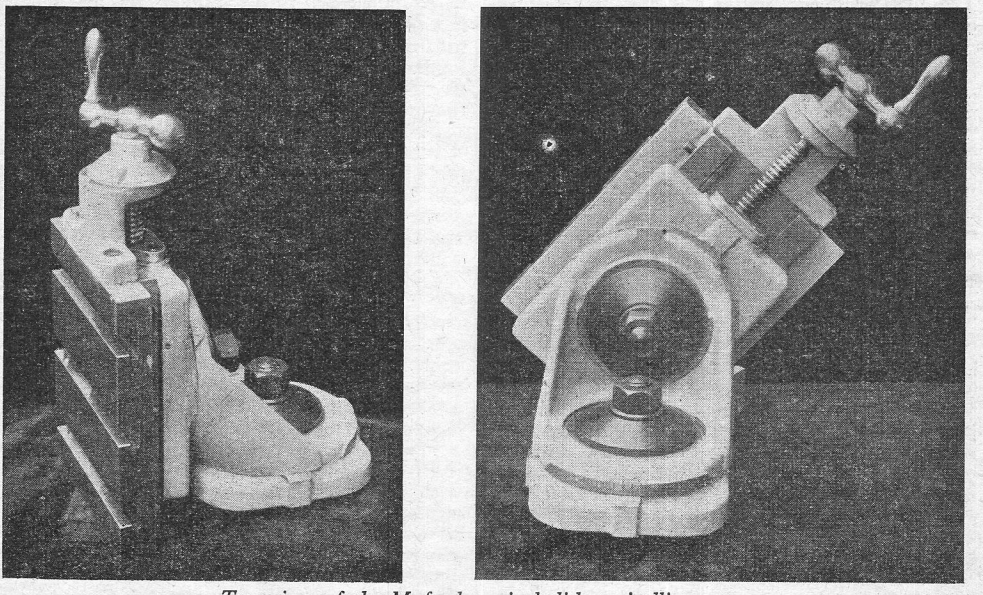
In some types of lathes, particularly those not equipped with a flat cross slide or boring table, it is difficult or impracticable to fit the normal type of vertical slide, but in most cases the makers of the lathes can supply a specially-designed vertical slide, or it may be possible to modify a standard slide, by modifying the base, or equipping it with a special sub-base.

When obtaining a vertical slide for use on any type of lathe, the user should take care to select the size and form best suited to his particular purpose. It is generally found advisable to use a heavily-built slide, with a table surface large enough to facilitate holding the largest job one is likely to deal with; but this should not be overdone, as it is futile to fit a vertical slide out of proportion to the size and structure of the lathe to which it is attached. The choice between a swivelling and non-swivelling type of slide is often a very difficult one, because, while the extra adaptability of the former is beyond question, and may be the deciding factor in the ability to tackle a particular job, its rigidity is almost inevitably somewhat inferior to that of the non-swivelling type, and this again may be the deciding



Senior vertical slide with horizontal angle bracket

factor in the capacity limitation of the appliance. It has already been mentioned that elaboration of milling appliances can only be obtained at the expense of rigidity, and obviously, the more slides, pivots, swivels or other articulated parts



Two views of the Myford vertical slide, swivelling type

contained in a milling appliance, the greater liability of the work to spring, or shift permanently from its set position, under cutting load.

Attaching Work to Vertical Slide

Whenever possible, it is best to clamp the work directly to the vertical slide, using tie-bolts in the table slots, and straps or toe clamps over some convenient part of the work. Simplicity and security of work-holding devices is always desirable, to reduce overhang and liability to slip. The use of vee-blocks, parallel packings, and the like presents no essential differences to that applied in attaching work directly to the cross slide, but there is, of course, no need to use "adjusting packings" under normal circumstances. It is usually desirable to set work at least approximately in position on the slide table, and partially tighten the clamping bolts, before setting up the vertical slide on the lathe, because otherwise, the manipulation of work, clamps, bolts and packings on a vertical surface, with everything all loose, may call for the manual equipment of a spider or an octopus.

A small machine vice which can be attached to the vertical slide is often very useful for holding small parts, especially those which have no convenient bolting surfaces. Sometimes vertical slides incorporating a vice in the structure of the table are encountered, and if this can be done without detracting from the rigidity of the slide as a whole, it is obviously a desirable feature. An angle plate built into or securely attached to the slide table is also very useful for dealing with parts having only a horizontal bolting surface.

In addition to the use of the vertical slide as a work-holding fixture, it is equally applicable to carrying milling and drilling spindles, dividing attachments, and similar appliances, when these are not equipped with their own means of vertical adjustment, and it is necessary to provide such means to deal with particular operations.

(To be continued)

"Key-men off Duty"

By "1121"

IN 1936, the Rt. Hon. Leslie Hore-Belisha, then Minister of Transport, on the occasion of his opening THE MODEL ENGINEER Exhibition, said, "In time of war the model engineer is a key-man." Much has been written, and much more will yet be written, about the models in the 1946 show, their variety, their standard of workmanship, and so on, but I would like to record a few random thoughts of a more personal nature on the happy reunion of so many friends which took place with the reinstatement of this unique function.

THE MODEL ENGINEER show has always been, to me, the landmark of the year. We dismantled the track, cleaned down the trestles (what a mucky job!) boxed up the locomotives, and got away in the lorry. By the time everything had been transported, and unloaded, in the small hours of Sunday morning, I for one was a little sorry that it was all over, and was looking forward to the next. We did that in 1938. We were all ready for the 1939 show—in fact, I think I still have a ticket for it somewhere—when things began to happen. Do you remember how we looked at the trenches they were digging in Vincent Square during the 1938 show, and thought how fantastic they seemed? Well, they were not fantastic. They became commonplace—part of our daily lives.

Don't let us brood too long on that far-off nightmare. Let us thank God that so many of that fine gang, who dispersed so rapidly to all points of the compass, seem miraculously to have gradually drifted together again, *via* the various functions arranged by the local societies, culminating in this fine climax! There are one or two gaps, it is true, but as we look round at all these eight-year-old faces, some a little thinner, some a little fatter; some a little greyer, some a little balder, but all a little older, and, it may be, a little wiser, surely we cannot help feeling profoundly thankful that those gaps are so few, and that such a great proportion of our old pals have become drawn together again after so long by the model engineer's own peculiar brand of magnetism.

I think I can introduce one little note of regret here without seriously affecting our great pleasure. It would have been nice to have come back to our old home for our grand reunion. The old Hall was almost as much a friend as the show itself, or the people in it. We must progress, I know, and nobody would want it otherwise, and we used to moan like fury at our cramped quarters on those hot September afternoons, but it would still have been nice to have had just this one get-together in our old meeting-place before marching onward.

Now, how did all those "key-men" shape up when the time came for action? I think that the fact that we had this show at all in 1946, with so much of its old atmosphere, speaks for them louder and surer than any words. How many of us would have liked to say for certain, in 1939, that we should be back at the show again in 1946? And if all these key-men (and key-women, don't forget) could make models of all the ships they have sailed in, all the locomotives that have hauled them, all the bridges they have crossed, all the aircraft which have borne them, and all the factories in which they have worked, what an Exhibition we could have then!

Did it ever occur to you, as you walked round the Exhibition this year, that many of those models had been built by those same little boys who clambered aboard our trucks at the 1938 show? Let us hope, anyway, that some of those young passengers, who showed such a keen interest in our engine, and its coal, and its shovel, have come back this year as full-blown exhibitors.

Now that, at long last, our garden has pushed itself through the rubble and blossomed again, with blooms seeming the fresher and more numerous for their lateness, let us hope that their seed will fall on fertile ground, and that our new generation of passengers, having sampled their first MODEL ENGINEER Exhibition, will follow in the footsteps of their predecessors.

H. J. H. on Accurate Dividing

THE only justification for the above title, off hand, is that it connects with correspondence in these pages some time ago on the subject, for, as will be seen, there can be some doubt as to whether accurate mechanical division is possible.

"Numerator" described in THE MODEL ENGINEER a method of graduating index plates and stressed his remarks in such manner that made one feel he knew his subject well. This was followed by a letter alleging certain unexplained shortcomings in his proposals and indicated that graduation to a high degree of accuracy is difficult of attainment. Would someone clear the air?

No direct attempt is made to do this, for it is equally difficult to achieve, as much depends on what is meant by "accurate dividing." For our present purpose it is probably convenient to consider the dictionary definition of "accuracy" and then set down the degrees of exactness or correctness in four main groups: mathematical; scientific; machine shop; and amateur workshop.

The reader may be able to suggest better headings for these groups which are intended to be in a descending scale of refinement. Do not, however, infer that any depreciation of an amateur's work is intended. He has often shown the way to the professional and, in the case of telescope making, forced the pace for him.

It is doubtful if constant mathematical accuracy has ever been achieved, even by such masters as Fraunhofer, Rowland, and Michelson. These good folk and others have shown that it is quite possible to make tens of thousands of rulings within an inch. The greater task is to make them identical in character and spacing, for although after years of patient labour a machine may be as perfect as may be and work under the most favourable of conditions the similarity of consecutive rulings depends upon the endurance of a diamond. If the latter happens to change its form for any reason the work is spoiled for there can be no stopping and restarting. For when the machine has settled down in a controlled temperature it is started from a remote position and left to carry out its task in solitude.

If anyone is brave enough to tackle and successfully reach empyreal standards the World of Science will meet him with open arms.

Under the next heading we may include setting circles for transit instruments, theodolites, telescope mountings and the like. Here again, it might be convenient to subdivide degrees of accuracy, but, in the main, remarks will be confined to the higher standards; just to see how things plan out.

Many amateur workers like to fit setting circles to their telescope mountings. They usually aim at too high a standard of accuracy for the intended purpose, and it is really far more important to aim at perfection in the driving mechanism than in the setting circles. That does not mean, of course, that the work should be done without care. In the case of a transit instrument the matter is somewhat different and too much care cannot be taken.

There is at Greenwich Observatory a transit instrument of great refinement in construction and mounting. Now although scientific workers did their utmost to make this instrument as perfect as they knew how we find that the daily routine at the observatory includes observational tests for errors and the making of daily corrections for those errors. In popular parlance a transit is used "for obtaining time from the stars." The process actually depends upon the earth's rotation. The earth is probably our most precise clock, but the rotation may slightly vary in rate. Time keeping is never an absolute thing, but a relative one. To many it will be a surprise to learn that a thing of no consequence is the fact that the sidereal clock at Greenwich is always in error. Corrections can however be applied to obtain the true time at any moment. It would not be a bad plan for us to follow the scientist and learn as much as possible regarding the errors in our instruments and know what limits may be put upon corrections.

Setting circles, protractors and the like are often graduated on automatic machines, as the results obtained automatically are considered to be more constant in character. Nevertheless, on really important jobs hand setting methods are often resorted to aided by a series of microscopes to determine and reduce various forms of error. Owing to the exigencies of the times, space prevents us going into this matter more thoroughly, but if you are interested try and read some literature on the subject. Three useful references would perhaps be Martin's "Optical Measuring Instruments"; Glazebrook's "Dictionary of Applied Physics," and the "Encyclopaedia Britannica."

Some of the better professional graduating machines will divide to better than a millionth of a circle. It would be a very ambitious undertaking to attempt making such a machine. All the same, some may wish to test their abilities at a compromise—a machine better than the usual commercial dividing head but not so precise as the foregoing. A well-fitting worm and worm-wheel are employed in these machines, and to obtain this feature the constructor may conveniently make the worm-wheel from two discs so that the two halves can be shifted and hobbed and lapped to the worm in many different positions, continuing until no visible error shows under a magnifying glass.

We now come to the machine shop section, and in passing it is interesting to note that our good friends Messrs. Tom Senior have produced a machine similar in appearance to the machines just referred to. Senior's machines have master plates for obtaining the requisite angular movement and are hand operated. They are used for marking micrometer collars, machine tool components and the like, and will mark on the flat, the periphery or at any angle. They are also

fitted with a device automatically determining the length of the graduations. Seven minutes is the time required for cutting 360 divisions. This machine is a self contained unit and quite unlike the usual form of universal dividing head used on milling machines.

The form of indexing heads employed in the machine shop is well known to readers, and although they are well made they contain several sources of error. With a view to eliminating these errors an optical dividing head has been introduced. One form of optical dividing head designed and produced by Messrs. Cooke, Troughton & Simms Ltd., has an inherent accuracy of only about 10 seconds of arc, and when used on light cuts enables results to be obtained within 20 seconds.

Enough has now been said to show that perfect accuracy has never been obtained, if ever, except by the greatest stroke of luck. This is very good reason why we should not despise the humble equipment of the amateur worker. It contains errors to be sure, but so apparently has every other device considered. Credit is due to the home worker for aiming at the best possible as far as his inclinations, pocket, and other conditions allow. He will probably be equipped as outlined in THE MODEL ENGINEER handbook, "Lathe Accessories," and provided the apparatus is carefully made and not used in a slipshod fashion he will be getting results which under the circumstances are satisfactory to him.

After possessing a home workshop for many years and approaching the problem from many angles with the endeavour to satisfy certain desires, the writer's principal indexing and dividing gear still comprises a magneto gear-wheel and a piece of 1-in. Whitworth screw. A wheel with 90 teeth is placed on the mandrel in order to materially reduce any possible errors in the index plate. It is realised that components better suited to a self contained machine would probably be of but little benefit if used on the end of a lathe mandrel subjected to the rigours of everyday use.

The disadvantage of a large wheel on the mandrel is that many turns have to be applied to the index arm to obtain fairly large angular movements of the work. But counting is not a serious business as the rows in the index plate have only a small number of holes in them, viz., 7, 10, 11, 12, and 25. In any event, if the results obtained are pleasing, time spent in the home workshop is of but little consequence.

As a matter of fact, direct indexing by arresting the movement of a lathe change-wheel fitted to the mandrel is often a better expedient than employing an elaborate assembly for the purpose. The simple detent used is just as effective as a well fitting worm for locking wheel and mandrel. If, however, a train of gears is employed to obtain some particular division, backlash must always be taken up in the same direction and the mandrel braked in some way. A weighted piece of belting placed over a step on the mandrel cone will serve as a brake if one end is fixed to bench or stand whilst the other end carries a suitable weight.

It does not appear to be generally known that the screwcutting table or chart supplied with a lathe may be used as an indicator of suitable gears to be used for obtaining required divisions. To do this it is necessary to attach to lead-screw or associated shaft as an index a gear having teeth to the number of threads per inch in the lead-screw; or some convenient multiple of it. Alternatively a worm and worm-wheel could be fitted and a simple notched plate fixed to the worm as an index. For "T.P.I." one reads divisions and sets up the gears on the banjo "backwards." That is to say what is shown as being fitted to the mandrel is applied to the lead-screw and the remaining gears placed in sequence, starting from the lead-screw.

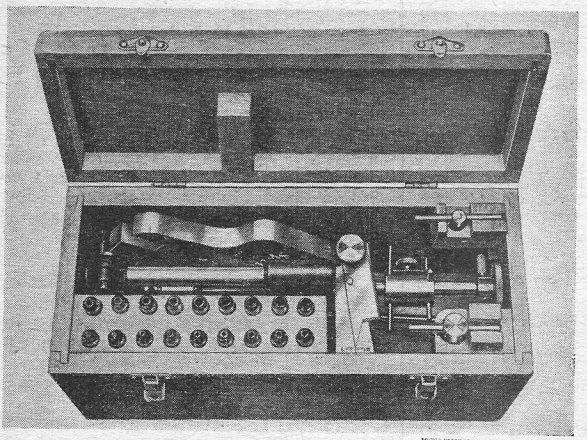
For example, in the case of the Drummond 4-in. lathe which has a lead-screw provided with 10 t.p.i., the gear fitted in a simple case would have ten teeth. Or a worm and worm-wheel would have a ratio of one to ten. Assuming eight divisions are required by way of a simple example which is easily followed, the 50 wheel would be placed on the lead-screw and the 40 on the mandrel. By moving the index gear with ten teeth just one tooth or rotating the worm once the 50 wheel is moved one-tenth of a revolution; which is an angular movement of five teeth. The 40 wheel on the mandrel is also moved five teeth and this corresponds to 5/40ths or $\frac{1}{8}$th of a whole revolution. Thus the work on the mandrel is moved the required number of stages in a revolution. If the wheel fitted to lead-screw had say 40 teeth in it instead of 10 it could be used to give 16 or 32 divisions as well as eight. Similarly notches in the index plate on the worm will serve as a simple multiplier. This is useful, because the chart may only show up to say 40 t.p.i., and it is a simple way of increasing its scope. Similar reasoning can be applied to compound trains. Always use the least possible number of gears. Hence in the case of eight divisions it would be better to fit a suitable wheel directly to the mandrel. Also use the largest wheel convenient, as any errors on its periphery will be much reduced on work of smaller diameter.

If screwcutting charts other than those supplied with the lathe are to hand they may be found of service at times if suitable gears or worm drives can be applied to the lead-screw or associated shaft. In this case the change-wheels supplied with the lathe might not always fit into the scheme so conveniently.

As in the case of professional and scientific equipment, the degree of accuracy to be obtained when using such equipment depends on the operator's knowledge of accidental, irregular and systematic errors and what he does to allow for them. The model engineer has gained high respect for his achievements in refined mechanism and manipulative skill. So there is no reason why he should not, in due time, obtain excellent results from a piece of apparatus which an uninformed onlooker considers rudimentary. Provided he realises accuracy is a relative and not an absolute thing he will probably automatically attain the degree of exactness he desires, thus following a parallel course with those who have striven to divide a circle or provide a graduating machine to the highest possible standard.

AN INGENIOUS TAP-GRINDING APPLIANCE

BOTH professional and amateur engineers often find it necessary to re-service taps which have become worn or damaged in use. Hand methods of carrying out this work are rarely quite satisfactory, even when the greatest care and skill are exercised; and the only efficient alternative hitherto available has been an elaborate set-up on a tool and cutter grinder.



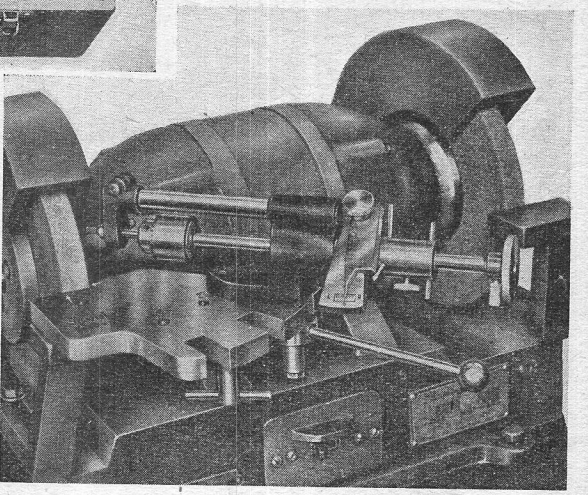
The complete ***tap-grinding*** *outfit packed in wooden case*

A new appliance recently introduced by Speed Tools Ltd., 35/6, Percy Street, London, W.1, makes it possible to re-grind taps on any ordinary tool grinder with great facility and accuracy. The device embodies a bracket with over-arm support and steady, mounted on a flat baseplate which can be attached to the standard tool-rest of the grinder, and provides three angular positions to suit taper, second, and plug taps respectively. All sizes of Whitworth form taps up to ¼-in. diameter, and B.A. sizes from 0 to 10, either right- or left-hand, and with three or four flutes, can be dealt with.

The tap is held in a chuck, and its shank steadied by means of a bush carried in the overarm support, being thus presented at the correct side angle for the type of tap being ground. Radial relief is effected by a sliding motion of the entire spindle, controlled by a simple but ingenious cam action, provided by a number of radial pins, corresponding to the number of flutes in the tap, which contact an adjustable inclined plane at the outer end of the spindle bearing. By adjusting the angle of this plane, the clearance angle of the tap can be varied, and both the endwise position of the spindle and the position of the pins relative to the tap flutes can be adjusted by shifting the collar carrying the pins.

Once set for the first cutting edge, the rest can be ground to precisely the same angle and extent by turning the spindle so as to bring each pin in turn in contact with the inclined plane.

The complete "Speetol" Tap Grinding attachment includes a set of steady bushes to suit standard sizes of taps within its range, and is supplied in a neat wooden case, as shown. It would appear that the principles of this appliance are applicable to a wide variety of grinding operations requiring angular control, and it should be found extremely useful in every machine shop and tool room.



The "Speetol" ***tap-grinding*** *attachment in use on a standard electric tool grinder*

THAT OLD PRESSURE GAUGE

IN a recent issue we published "The Tale of a Pressure Gauge" in whch the writer related how he had retrieved and preserved a pressure gauge from an old locomotive which had been for a long time relegated to the scrap heap. Mr. H. G. Ivatt, the Chief Mechanical Engineer of the L.M.S., after reproving the writer for helping himself to Company's property, says: "Apart from this, as a souvenir of the old engine, the gauge is not of much value to him, as it is in all probability of recent manufacture." There is a moral in this for other souvenir collectors.

Letters

Thanks

DEAR SIR,—May I express my sincerest thanks to you and the two very generous readers of "Ours" who forwarded petrol coupons to me after the recent note in "Smoke Rings. The offer came so rapidly that I was temporarily knocked off my balance! Now that the initial shock is over I find I have another problem; that of storage! However, I think with the help of fellow members we will be able to lay in sufficient for the whole of next season.

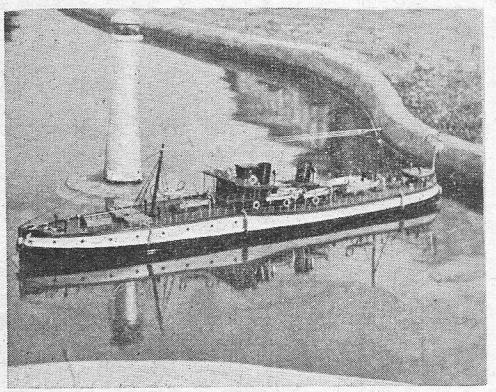
Again thanking you all.

Yours faithfully,

York. W. SHEARMAN.

A Missing Model

DEAR SIR,—I am trying to trace a former model ship of mine (the first model I made) for sentimental reasons; it was sold by mistake, in 1943, whilst I was serving in the Forces.



I am advertising for the model, but, as it is rather difficult to describe, I wondered if you would be so kind as to publish a photograph, as an aid to identification.

Yours faithfully,

New Barnet. C. S. J. ROY.

Steam Consumption of Turbines

DEAR SIR,—Further to my previous letters on this subject, I recently came across some data on the steam consumption of the turbine used in the V2 Rocket.

This turbine, of the single-wheel variety, developed about 600 h.p., and one may be quite sure that economy of consumption would be a vital consideration in the minds of its designers; it required steam at the rate of 18 lb. per b.h.p.-hour, a rate equal to at least two and a half times that which would be required by a modern triple-expansion engine of one-sixth the power with inter-stage reheating.

This is just one more bit of evidence that the small turbine, whatever its other virtues, and they are many, is, on a basis of steam consumption, completely out of the hunt when competing with the small reciprocator. Figures of an actual test given in your issue of August 29th, show, that even when compared with a little single-acting oscillator, a small turbine was taking anywhere from 1.8 times as much steam to 3.65 times as much, power for power.

Yours faithfully,

Harrow. K. N. HARRIS.

White's Tunnel Engine

DEAR SIR,—In your issue dated August 22nd last, you reproduced a photograph sent to you by Mr. A. S. Connor, of Welling, of a locomotive of about 18 in. gauge, suggesting that this was the Riddlesdown engine referred to by "L.B.S.C." in your issue for May 30th last.

I would like to point out that this cannot be the same engine, as if you refer to the photograph you will see that it was taken at Cardiff in 1908. I can state quite definitely that the one at Riddlesdown was a permanent fixture from 1904 until 1911, when I left the district. I have seen it running and have ridden on it quite a number of times in that period.

I have been told by a friend that the locomotive was still running in 1926 as a permanent fixture, as I described to you, and that he had ridden on it in that year.

The track was cut out of the side of the downs, was circular, and had a small station.

Yours faithfully,

Lee, S.E. F. H. BOTELL

(*Member of Kent Model Engineering Society*).

R.R. & G. Railroad

DEAR SIR,—I was very interested in the cover illustration on the August 29th issue of THE MODEL ENGINEER and think the following details may be of interest.

The Red River & Gulf Railroad was incorporated in 1905 and the total mileage, including leased lines, was 66, situated in the State of Louisiana, and operated with two locomotives and six cars. In its prosperous days dividends were as high as 40 per cent. Prior to the late war a portion of the line was abandoned. Of its fortunes or misfortunes since 1939 I have no knowledge.

Yours faithfully,

Bexhill. A. R. TEMPLE.

Another Missing Model

DEAR SIR,—In the 1935 MODEL ENGINEER Exhibition, Mr. Arthur Merrington, B.Sc., showed a 1-in. scale showman's road locomotive for which he gained a silver medal. Shortly after, Mr. Merrington—now Dr. Merrington—sold this model to, he believes, the East Kent Model Engineering Society.

As he now has a little more free time than he has had in the intervening years, his thoughts have once more turned towards model engineering and he would like to have his model as a nucleus and inspiration for further activities.

Could any reader help him in tracing the model?

Yours faithfully,

Rudgwick. P. R. SLATTER

(*Godalming M.E. Society*).

Getting Together

DEAR SIR,—I was greatly interested in the letter from Mr. A. F. Duckett in THE MODEL ENGINEER for September 25th with reference to the Northern Association of Model Engineers, and am in fullest agreement with his suggestion that clubs should get together.

During last year the various model clubs in Bristol, feeling that a joint exhibition would be the best way of getting together the model makers in the City, formed a committee to organise it. The exhibition was a great success, and the clubs, having discovered the benefits of co-operation, voted for the continuance of the committee as a "Joint Model Clubs' Committee." The clubs concerned are the Model and Experimental Engineers, the Model Yacht Club, the Model Aeroplane Club, The Model Railway Circle, the Model Power Boat Club and the Ship Model Club, the combined membership totalling well over 300.

As a result we have persuaded the City Fathers to allocate a site in one of the public parks for a multiple-gauge railway track, and there are good prospects of a sailing lake in the not too distant future.

The committee has been approached by various youth clubs in the City, and a joint exhibition and probably talks by various model club members will almost certainly be the result.

For the recent MODEL ENGINEER Exhibition the committee arranged the transport of a consignment of models, including two ship models in cases 6 ft. long, and the cost was not unreasonable. Certainly they would never have been sent if it had been left to the "private enterprise" of the modellers.

The powers of the committee are well defined in the constitution drawn up, and are strictly limited; but even so the benefits to be derived from co-operation of this kind are deserving of the consideration of any group of clubs.

Yours faithfully,

Bristol. EDWARD BOWNESS.

Clubs

The North London Society of Model Engineers

At the October meeting of the above Society members and friends enjoyed a lecture and demonstration on "Direct Sound Recording on Disc" by Mr. C. E. Watts and Mr. E. Dixon.

The next general meeting takes place on November 1st, when Mr. H. White will give a talk and demonstration on "Welding and Brazing."

General meetings are held on the first Friday of each month at the offices of The Barnet District Gas & Water Co., Station Road, New Barnet, commencing at 8 p.m.

Plans for the Society's exhibition to be held early in January are well advanced.

Hon. Sec.: E. H. GUTTRIDGE, "Wykehurst," Parkgate Avenue, Hadley Wood, Herts.

South London Model Engineering Society

At the meeting for November 3rd Mr. Clark will give a talk describing the reconstruction of a 3½-in gauge loco. This meeting will be held at King's College Sports Ground, Dog Kennel Hill, East Dulwich, at 11 a.m.

At the following meeting, November 17th, time and place as above, Mr. Reed will describe the alterations and improvement he has made to a lathe.

Particulars of the Society can be obtained on application to the Hon. Sec., W. R. COOK, 103, Engleheart Road, Catford, S.E.6.

Leicester Society of Model Engineers

The Society is holding its first post-war exhibition on Thursday, Friday and Saturday, October 31st, November 1st and 2nd, in St. Marks Schools, Belgrave Gate, Leicester. The official opening will be at 3 p.m. on the Thursday by Alderman David Bentley, J.P., a well-known Leicester engineer.

Some 200 models covering every phase of model engineering will be on show, trade stands, the ever popular passenger railway and, of course, the refreshment room.

Old and new friends will receive a cordial welcome, so remember the dates and the place.

Hon. Sec.: E. DALLASTON, 67, Skipworth Street, Highfields, Leicester.

Welling and District Model and Experimental Engineering Society

The officers elected at the annual general meeting were: Chairman, Mr. C. A. Clark; Secretary, Mr. J. A. King; Treasurer, Mr. L. W. Betts; and Messrs. Atkinson (sen.), Higgs (sen.), Clinch and W. Dixon were elected to form the Committee for the ensuing year.

It was decided to spend the sum of £15 on books and tools for the club library, and an offer by Mr. Clark to make the club badges was accepted with approval by everyone present.

At the meeting arranged for October 25th there will be a lantern lecture by Major Collins on "G.W.R. Locomotive Practice," and will be followed by a film of the Society's track by Mr. Holmes. Negotiations are taking place to hold it in the hall of the Bexleyheath Sports Club.

Visitors from other societies will be welcomed and are asked to write to the secretary beforehand in order that accommodation can be arranged.

Hon. Sec.: J. A. KING, 150, Sutherland Avenue, Welling, Kent.

The Junior Institution of Engineers

Friday, October 25th, at 6.30 p.m., 39, Victoria Street, S.W.1. Informal meeting. "Water Pumping Machinery," by H. K. Hewitt (member). Slides.

Friday, November 1st, at 6.30 p.m., 39, Victoria Street, S.W.1 Discussion Groups. "High Temperature Insulation," to be opened by R. L. Ballard (Associate Member).

Western Group of Members.—Friday, November 1st, at 7.30 p.m., Merchant Venturers Technical College, Unity Street, Bristol.

" Geology in Engineering," by F. L. Daniels, M.I.Mech.E., F.G.S. Slides.

North Western Section. Saturday, November 2nd, at 2.30 p.m., Manchester Geographical Society, 16, St. Mary's Parsonage, Manchester. Ordinary meeting, " Some Notes on the Uses of Stainless Steel for Engineering Purposes," by C. H. Faris, M.I.Mech.E. (Member.)

Midland Section.—Wednesday, November 6th, at 6.30 p.m., James Watt Institute, York House, Gt. Charles Street, Birmingham. Ordinary meeting.

Friday, November 8th, at 6.30 p.m., 39, Victoria Street, S.W.1. Ordinary meeting, " Sugar Beet and Engineering," by H. W. Arkell (Member).

Saturday, November 9th, at 7 p.m., Annual Dance to be held in the Paviour's Arms, Page Street, S.W.1.

North Western Section.—Monday, November 11th, at 7 p.m., Manchester Geographical Society, 16, St. Mary's Parsonage, Manchester. Ordinary meeting. " Modern Factory Lighting," by J. W. Howell, D.L.C., M.I.E.E., F.I.E.S.

Friday, November 15th, at 6.30 p.m., 39, Victoria Street, S.W.1. ANNUAL GENERAL MEETING.

Glasgow Society of Model Engineers

The next meeting will be held within the Society's Rooms at 60, Clarendon Street, Glasgow, N.W., on Monday, October 28th, at 7.30 p.m. *Jointly with the Stephenson Locomotive Society, the Glasgow and West of Scotland Model Railway Society and ourselves,* a series of meetings have been arranged to encourage the common interest in the locomotive, so markedly evident in all three bodies. It's a far cry from " O " gauge to full-size practice, while again the tangent into large-model scale will not appeal to all. Within the Royal Technical College the experiment will be tried, while a speaker from the North British Locomotive Co. Ltd. should prove an attract on. This meeting will be under the chairmanship of T. Hally Brown, the able President of the local Stephenson Locomotive Society. We trust our members will hear ily support this meeting, the first of a series of three.

Visitors will be welcomed and particulars of membership can be had from the address below. Hon. Sec. : JOHN W. SMITH, 785, Dumbarton Road, Glasgow, W.1.

Portsmouth Model Engineering Society

The annual general meeting was held on October 2nd at the Central Library, when the chairman, Mr. T. A. Bedford, gave a report on the society's activities during the past year. He mentioned that the society had purchased a fine lathe and drilling-machine, but the major problem was finding suitable accommodation. The City Council had been approached for a site but held out no hopes owing to replanning and housing problems.

The election of officers resulted in Mr. T. A. Bedford being re-elected Chairman ; Commander L. A. Brown, R.N.V.R., Vice-Chairman ; Mr. H. A. Handsford, Secretary ; Mr. C. H. S. Chandler, Assistant Secretary ; Mr. E. Scott, Treasurer ; Mr. C. H. S. Chandler, Assistant Treasurer ; Messrs. J. M. Coxall, L. V. See, F. L. Brown, C. W. Chandler, C. E. Newall, C. A. Lane, executive committee.

At next month's meeting, November 6th, Central Library, at 7 p.m., there will be a lecture by Mr. Hodgson, Senior.

Visitors are welcomed and particulars of membership can be obtained from the Hon. Sec. : H. A. HANDSFORD, 5, Milton Road, Southsea.

Sale Model and Engineering Club

The Club paid a visit on Monday, September 16th, to the Broadheath Works of The Pulta Lathe Co. Ltd., makers of small precision lathes. Dr. Shaw and his colleagues conducted the Club around in small parties of approximately five and described in detail each stage of the machining processes. The machining operations for Collets commanded much attention, particularly the method of slitting the collets, after hardening, with a wafer-thin carborundum wheel. Great interest was aroused in the Pultra capstan lathe, which handles bar up to and including 7-mm. diameter, and for which innumerable attachments are available.

On Monday, September 30th, a visit was paid to the L.M.S. Signalling School at Victoria Station, Manchester, where Mr. Gibbon, of the L.M.S., gave a lecture and demonstration of modern absolute block railway signalling. The lecture room is equipped with approximately 150 ft. of double track, in the form of a " U " with the legs closed in, of No. 1 gauge and is complete with numerous sidings, crossings, four signal frames and one ground frame. Each signal box is equipped with a scale frame and full-sized instruments with full electrical and mechanical interlocks. A small tank engine, fitted for third (outside) rail electrical pickup, is used for demonstration purposes and we understand originated in the Horwich works of the L.M.S., *circa* 1908. This engine, after very gallant service, is to be replaced by five modern type locomotives.

Hon. Sec. : J. H. S. WILLIAMS, 145, Park Road, Timperley.

Proposed Club for St. Austell

The formation of a model engineering club in St. Austell, Cornwall, is being contemplated. Any reader interested in this idea is invited to communicate with A. C. RABEY, Prideaux, High Street, St. Austell, Cornwall ; or M. R. LIDDICOAT, 126, Tremaine Place, St. Austell, Cornwall.

NOTICES

The Editor invites correspondence and original contributions on all small power engineering and electrical subjects, which should be addressed to him at 23, Great Queen Street, London, W.C.2. Matter intended for publication should be clearly written, and should invariably bear the sender's name and address.

Readers desiring to see the Editor personally can only do so by making an appointment in advance.

All correspondence relating to sales of the paper and books to be addressed to THE SALES MANAGER, Percival Marshall and Co. Ltd., 23, Great Queen Street, London, W.C.2.

Correspondence relating to display advertisements to be addressed to THE ADVERTISEMENT MANAGER, " The Model Engineer " 23, Great Queen Street, London, W.C.2.

"THE MODEL ENGINEER"
SALES AND WANTS

Private: **Threepence** *word.* *Trade*: **Sixpence** *word.* *Use of Box* **2/6** *extra*
Minimum charge, **3/-**

TOOLS & WORKSHOP

Buck and Ryan's Department for Lathes, Drilling Machines, Grinders, Electric Tools, Chucks, Surface Plates, Lathe Accessories and Tools.—310-312, Euston Road, London, N.W.1. Telephone: EUSton 4661. Hours of Business: 8.30 to 5.0 p.m., Monday to Friday; Saturday, 1.0 p.m.

Split Chucks for Watchmakers' Lathes, 6 mm., 6½ mm., and 8 mm., at 7s. each, postage 6d.—JOHN MORRIS, 64, Clerkenwell Road, London, E.C.1.

Infinitely Variable Speed Gear, ratio 16 : 1, materials supplied, leaflets—CROWTHER, 85, Charlotte St., Rochdale.

"Little John" Lathes. Sole Selling Agents for Home and Export. Send for illustrated literature and orders to—THE ACORN MACHINE TOOL Co. (1936) LTD., 610/614, High Road, Chiswick, London, W.4. Telephone: CHIswick 3416 7-8-9.

Clearance Workshop. Few bargains in unused H.S.S. End Mills, S. and F. Cutters, Shell Mills, Slab Cutters and other milling tools. Guaranteed quality and your approval. Send S.A.E. for full particulars. Bargains.—Box No. 4151, MODEL ENGINEER Offices.

Another "Service" Publication: Our **"Service Sheet of the Myford Lathes,"** giving full list of attachments and spares for ML2 and ML4, attachments for "M3½." Working drawings and instructions for fitting chucks, thread dial indicators, calculation of changewheels for given t.p.i. Should be on every workshop wall. Limited edition only, 7d., post free. Obtainable only from—GARNERS, Sheffield Road, Barnsley.

Surplus Machine Tools, Lathes, Shapers, Grinders, Millers, Bandsaws, Drills, Welders, Slotters, Compressors, Niblers, Linishers, Flypresses, Capstans, Electric Motors, etc. Low prices. List free.—VICTA ENGINEERING COMPANY, Maidenhead, Berks. Telephone 50.

5" Pittler Lathe on Stand. Collet, Milling, and other attachments, Tools, etc. Very good condition, £70.—DALESC (ENGINEERS) LTD., Brockenhurst, Hants.

Wanted, for 2" Wade Lathe: Tailstock Assembly.—COTTINGTON, 27, Western Road, Haywards Heath, Sussex.

Two Quick Release Bench Vices, 4" jaws, £3 5s. each.—ESCOTT, 26, Sunnyside Road, Epping, Essex.

5" Centre Sheldon Toolroom Lathe, motorised, 250/1/50, complete with change wheels, 3 chucks, vertical slide. Offers.—Box No. 4170, MODEL ENGINEER Offices.

MODELS & FITTINGS

Apex and New Atom Minor (Mr. Westbury's design). Engine castings of DTD 424, the famous alloy as used in Rolls Royce Aero engines, sp. gr. 2.56. Tensile 9 tons, lighter and far stronger than diecast, with most attractive finish. Carburettor castings described June 14th issue "M.E."), and spiral timing gears for Apex, ball-races, piston rings, miniature plugs, contacts and other equipment. Send us your enquiries. Trade also invited.—THE HEADINGLEY MOTOR & ENGINEERING CO. LTD., 8, Otley Road, Leeds.

For Sale, Electric Tramcar Model, fully working 4" gauge, very good workmanship. Would exchange for Steam Locomotive, with cash either way if required.—Box No. 4157, MODEL ENGINEER Offices.

For Sale, 2-6-4 Free Lance Tank Engine, coal-fired, scale ½" to one foot. Offers over £60.—Box No. 4155, MODEL ENGINEER Offices.

Wanted, Set of Castings for "M.E." Projector. Odd castings considered. Details and price to—ROGERS, 32, Alma Street, Wellingborough.

For Sale or Exchange, 8" gauge 4-4-0 Locomotive and Tender, Adams L.S.W.R. Needs overhauling. Will exchange for smaller 2½" or 3½" gauge, with cash adjustment where necessary.—Box No. 4158, MODEL ENGINEER Offices.

For Sale, 3½" gauge "Rainhill" Locomotive and Tender, coal-fired, £17; set of Castings for small vertical engine, and copper tube for boiler, £1 5s. Several Stationary Engines and Boilers.—Box No. 4159, MODEL ENGINEER Offices.

Wanted, Fulmen Type 30 Watt Generator, finished or castings.—17, Lingfield Grove, Broadgreen, Liverpool.

Quality Castings for most L.B.S.C. type locomotives in stock. S.A.E. lists.—A. BARTRUP, 4, Northview Drive, Woodford Green, Essex.

Model Locomotives. Convert to your favourite, instance L.N.W.R. George V. to S.R. Schools, any scale up to 7¼" gauge. Rebuilds and repairs specialised. First class workmanship and design. Estimates free against description or photograph.—JOHN P. MERCER, 70, Goldsmid Road, Tonbridge, Kent.

3½" Gauge Pacific Locomotive, will pull 30 children, £150; 5 c.c. Petrol Engine for aeroplane, boat, or car, £8 10s. — MILLS RADIO, Northfield, Birmingham.

5" Gauge Passenger Track, brass rails, oak sleepers, 60' circle on longitudinals and posts, £25. Purchaser collects.—HANCOCK, Greenacre, Beaconsfield.

Trix "OO" Gauge. Very large layout, over 300 pieces, including 166 straight, 61 curved, and ten L.H. and R.H. points, 4 locomotives, stations, 2 transformers, 4 controllers, etc.—E. SELLERS, 20, West Park, Harrogate. Phone 5713. £70 or near offer.

ELECTRICAL EQUIPMENT

720 ft. Coils of 1¼ circumference Sizal Rope, brand new, unsoiled, 27s. 6d. per coil. Green Waterproof Covers, first class quality, eyeletted and roped, 8 × 7, 25s. each; 6 × 5, 20s. each, perform a variety of useful purposes. Complete Instrument Panels ex Churchill Tanks, comprising the following: speedometer, rev. counter, head, side, tail and concealed lighting switch panel, junction and 5-way fuse box, radiator and oil sump thermometers, 2 petrol gauges, 0-60 ampmeter, oil gauge, relay starter button switch, small turn switch, concealed lighting lamps, etc. All instruments of the highest possible quality, new and unused; match with standard car instruments, also most useful for power boats, £10 10s. complete.—TEDDINGTON ENGINEERING COMPANY, 29, High Street, Teddington, Mddx. Kingston 1193/4.

£3 5s. 0d., 8" diameter Exhaust Fans, porthole type, 200/250 volts, 50 cycles, single phase, 1,200 t.p.m., new.—JOHNSON ENGINEERING, 319, Kennington Road, S.E.11.—RELiance 1412/3.

Electrical Motors, reversible, A.C./D.C., 4-24 volts, 2½" × 2" × 1¾", 10 ozs., ideal for models, runs off batteries or transformer, 25s. 8d.—EMCO, 118, Foleshill Road, Coventry.

Electradix Bargains include:—

Dynamo and Motor Generator Bargains. G.E.C. double current Dynamos, 6 volts, 5 amps., 600 volts, 80 m.a., ball-bearings, 17 lb., as new, 37s. 6d., carriage paid, 5s. refunded on returned packing case. D.C. Dynamos, 12 volts, 10 amps., £4 10s.; 30 volts, 5 amps., £7 10s.; control box, fitted cut-out and regulator, 21s.; 120 volts, 4/5 amps., D.C. Dynamos, £8 10s.—Below.

Small D.C./D.C. Motor Generators by leading makers for use in Radio Receivers to take the place of H.T. battery, 6 volts input, 110 volts, 15 m.a. output, or 12 volts input, 230 volts, 30 m.a. output, £3 15s., weight only 5½ lb., size 5½" × 3½" × 3½", model finish, ball bearings, 2-comms, 2 separate windings, waterproofed.—Below.

Transformers, 3 K.W. Crypto, 230 volts to 115 volts, 28 amps., £9 10s.; to small Bell Transformers, 230/3/58 volts, 7s. 6d. Transformers for Rewind, 3 K.W. with stampings, 4½" × 6" × 7½", windings damaged by blitz, weight with damaged wire, 65 lb., 45s., carriage extra.—ELECTRADIX, 214, Queenstown Road, London, S.W.8.

1/3 H.P., £7, ¼ H.P., £5. Both 220-250 A.C., 1 phase; MODEL ENGINEERS, bound volumes, 80 to 93, £1 each.—Voss, 25, Parkbrook Road, Northenden.

Wanted, Small Model Dynamo, S.T. or other make.—WEEKS, Comforts Farm, Near Cowes.

1/40 H.P. 230/240 V. Single Phase, a.c. ball-race electric Motors, non-reversing, brush induction, ½" spindle drive projection one end, 2,800/3,000 revs. continuous running. Measurements 5½" long, 6" wide, 4½" high. Sturdily made ex Government stock. 700 in stock, all reconditioned, resprayed and guaranteed. Price £3 10s. 0d. each, carriage paid.—J. WARD, Anchor Cottage, Shepperton.

GENERAL

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Printed in Great Britain for the Proprietors by ELECTRICAL PRESS, LTD., Cordwallis Works, Maidenhead, Berks., and published by PERCIVAL MARSHALL & CO., LTD., 23, Great Queen Street, London, W.C.2.